

PROJECT MANUAL

ON-CALL

SANITARY AND STORM SEWER

COLLECTION SYSTEM

REPAIR AND REPLACEMENT



PROJECT I.D. 6301

ENGINEERING DIVISION, PUBLIC WORKS DEPARTMENT

UNIFIED GOVERNMENT OF WYANDOTTE COUNTY/ KANSAS CITY, KANSAS

CONTRACT DOCUMENTS

FOR

**ON-CALL SANITARY AND STORM SEWER COLLECTION SYSTEM
REPAIR AND REPLACEMENT**

PROJECT ID: 6301

ENGINEERING DIVISION
of

PUBLIC WORKS DEPARTMENT

Prepared by: _____
Professional Engineer Date

Approved: _____
Director of Water Pollution Control Date

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**LEGAL NOTICE OF REQUEST FOR PROPOSAL
UNIFIED GOVERNMENT OF WYANDOTTE COUNTY/KANSAS CITY, KANSAS
OFFICE OF THE COUNTY ENGINEER**

Proposals are being solicited for a capital construction project known as:

Project Name	On-Call Sanitary and Storm Sewer Collection System Repair and Replacement
Project ID No.	6301
Proposal Date	August 8, 2024
Contract Time	365 Calendar Days

Proposals will be received until 2:00 p.m. on the above date, at the Office of the Unified Government Clerk, 3rd Floor, Municipal Office Building, 701 North Seventh Street, Kansas City, Kansas, 66101. Proposals will not be publicly opened or read aloud.

*Project goals for MBE/WBE participation are NOT part of this solicitation.
Prevailing Wage Rate is part of this solicitation.*

Printed copies of the Contract Documents consisting of the specifications, together with Request for Proposal, Proposal Questionnaire, Price Proposal form and forms of contracts, performance bond and labor and material payment bond may be obtained from Drexel Technologies at <http://www.drexeltech.com/>.

Additionally, Contract Documents may be picked up at Drexel Technologies on a CD or downloaded electronically. See the Drexel Technologies website for pricing. All purchases are non-refundable. Drexel Technologies can be contacted by phone at (913) 371-4430 or electronically at <http://www.drexeltech.com/>. Contract Documents will be shipped only if the requesting party assumes responsibility for all related shipping charges. Corporate, certified, or cashier's checks shall be made payable to Drexel Technologies.

The Contract Documents may be examined online at <http://www.drexeltech.com/>, in person during regular business hours at Drexel Technologies, 10840 West 86th Street, Lenexa, KS, 66214-1632 or at the office of the Director of Water Pollution Control, 50 Market Street, Kansas City, KS, 66118.

A **MANDATORY** Pre-Proposal Conference will be held at **8:30 am**, Central Standard Time, on **July 23, 2024**, in the **large conference room (Room 207)** on the **second** floor of the **Kaw Point WWTP Administration Building** located at **50 Market Street**. Attendance is mandatory for prospective Offerors proposing as prime Contractor. After the Pre-Proposal Conference, electronic copies of the Price Proposal (Microsoft Word) and Proposal Questionnaire (Microsoft Word) will be distributed to Offerors that attend the Pre-Proposal Conference.

The Unified Government reserves the right to reject any or all Proposals. The Request for Proposal contains additional requirements. Award will be made to the responsible Offeror whose Proposal is determined to be the most advantageous to the Unified Government taking into consideration price and the evaluation factors described in the Request for Proposal.

The Unified Government of Wyandotte County/
Kansas City, Kansas

County Engineer

Unified Government Clerk

Department of Procurement and Contract Compliance

REQUEST FOR PROPOSAL



RFP R40989 For “On-Call Sanitary and Storm Sewer Collection System Repair and Replacement”

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Article I. General Information

Section 1.01 *Method of Source Selection*

Section 29-154 of the Unified Government of Wyandotte County / Kansas City, Kansas (Unified Government) Procurement Code and Regulations allows for the use of Competitive Sealed Proposals when it is determined in writing that Competitive Sealed Bidding is either not practicable or not advantageous to the Unified Government.

Utilization of Competitive Sealed Proposals for this project has been approved by the Public Works Director. Award will be made to the responsible Offeror whose Proposal is determined to be the most advantageous to the Unified Government taking into consideration price and the evaluation factors described in Article VII of this Request for Proposal (RFP).

Section 1.02 *Purpose*

The Unified Government Department of Public Works is accepting competitive proposals from qualified individuals, firms, partnerships and corporations for the purpose of constructing the sanitary and storm sewer collection system repair, replacement, and rehabilitation identified in the Contract Documents titled, "On-Call Sanitary and Storm Sewer Collection System Repair and Replacement."

The Unified Government is seeking to enter into a term and supply contract with one or more sanitary and storm sewer collection system construction firms to provide on-call, planned, and emergency construction work on wastewater and stormwater collection system infrastructure. This contract will be used to conduct construction work when the Unified Government determines it is more cost-effective than the normal design-bid-build construction process or when the work must be expedited.

The scope of work for each project will be to repair, rehabilitate, replace, or mitigate a defect or failure in the collection system and fully restore the work site to equal or better condition. Occasionally, the work will be in response to wastewater and stormwater collection system failures requiring an immediate response to minimize property loss or environmental damage; this work is generally expected to be of short duration. The contractor shall furnish all labor, tools, equipment, supplies, materials, and appurtenances necessary to perform routine and emergency work authorized under this contract.

Examples of work that may be required include, but are not limited to, the following:

- Gravity sewer pipe and manhole repair and replacement
- Gravity sewer pipe cleaning and televising
- Sanitary force main repair
- Sewer easement clearing and mowing
- Ditch restoration and installation
- Sewer stream crossing repairs and replacement and stream restoration
- Civil site work – earthwork, clearing and grubbing, trenching, paving, modification or replacement of landscaping, fencing, traffic control, etc.
- Appurtenant work – bypass pumping, confined space entry, handling of wastewater and wastewater residuals/solids, coordination with property owners, and restoration of private property.

Offerors providing such services must meet the requirements of this RFP.

Solicitations from qualified minority and women owned businesses, firms and individuals are encouraged by the Unified Government. This encouragement does not infer preference and all solicitations will be evaluated equally.

This contract may be awarded to more than one contractor to ensure resources are available when they are needed, thereby providing prompt service to the community. Projects to be assigned to the contractor will be identified by the Unified Government. **No minimum contract amount is guaranteed; however, the annual maximum dollar value is estimated to be \$2,000,000 total for all contracts resulting from award of this RFP.**

Section 1.03 Project Procedures

Projects will generally be initiated as follows. For unplanned or emergency work, these steps will be streamlined to expedite the work.

- **Planned Projects.** The Unified Government will identify projects that meet the stated purpose of this contract and develop a scope of work. One of the Unified Government's contract consulting engineers may be utilized to assist with the scope of work and to develop detailed plans and specifications.
- **Unplanned Projects.** The Unified Government, at its sole discretion, will select a contractor from those selected from this RFP and approach them with the project. Contractors are required to respond with a company representative to the repair site within two (2) hours upon notification by Unified Government staff. Contractor will be given time to assess the scope of work and the appropriate equipment and personnel to complete the work. Contractor is then required to begin mobilization on a timeline as directed by the Unified Government after completing the initial site visit. Mobilization times will vary depending on the specific urgency of the project, but typically 24 to 48 hours after the initial site visit. Because this work may involve the repair of buried infrastructure, the scope of each job may not be entirely known until work commences.
- **Contractor Proposal.** The Unified Government, at its sole discretion, will select a contractor from those selected from this RFP and approach them with the project. The contractor will review the details of the project (which may include plans and specifications) and submit an itemized cost estimate for review by the Unified Government and the Unified Government's contract consulting engineer, if applicable. Estimates shall utilize contract pricing and shall be as firm and accurate as is possible without undue effort by the contractor. The Unified Government, engineer, and contractor shall discuss the proposal and make any necessary modifications until the proposal is acceptable to all parties.
- **Authorization of Work.** The Unified Government will issue a written project Authorization to the contractor (signed by both parties), which confirms acceptance of the contractor's proposal and establishes the scope of work and special contract terms and conditions by adopting the plans and specifications into the Agreement (i.e., term and supply contract). The project Authorization will be issued with an official notice to proceed date.
- **Purchase Order.** The Unified Government will issue a Purchase Order to the Contractor. The Purchase Order amount is considered a maximum not to exceed cost that cannot be exceeded without a change order that has been approved by the Unified Government. If, during the course of a project, it becomes apparent that the maximum not to exceed cost needs to be increased due to a change in scope; contractor will

immediately inform the Unified Government and submit a detailed cost estimate for the change in scope and expected increase.

- The Unified Government is not obligated to use this term and supply contract for any work. The contract will be used at the sole discretion of the Unified Government.
- If more than one contractor is awarded this term and supply contract, the Unified Government has sole discretion in selecting which contractor is awarded each project. For some projects, the Unified Government may interview contractors prior to selecting one to submit a cost proposal.
- Although it is not the intent of this term and supply contract that bids be solicited for a project, this does not preclude the Unified Government from obtaining a cost estimate from more than one term and supply contractor.
- Contractors are not guaranteed the award of any project under this term and supply contract. There is no minimum number of projects or dollar amount of projects to be awarded.
- This term and supply contract has an annual not to exceed dollar amount that is authorized, as established by the Unified Government Board of County Commissioners, at that time of contract authorization.

Section 1.04 Existing Environment

The Unified Government of Wyandotte County/Kansas City, Kansas is a consolidated city/county government serving all of the citizens of the City of Kansas City, Kansas, and Wyandotte County. The City of Kansas City, Kansas is located entirely in Wyandotte County and, along with ten other Kansas and Missouri counties, makes up the Metropolitan Kansas City Region with a population of approximately 1.6 million. The Cities of Kansas City, Kansas and Kansas City, Missouri are separated by the Kansas-Missouri border and are independent of one another in all aspects.

Section 1.05 Required Review

Offerors should carefully review this solicitation for defects and questionable or objectionable matter. Comments concerning defects and objectionable material must be made in writing and received by the Procurement Officer at least ten days before the Proposal opening. This will allow issuance of any necessary amendments. It will also help prevent the opening of a defective solicitation and exposure of Offeror's Proposals upon which award could not be made. Protests based on any omission or error, or on the content of the solicitation, will be disallowed if these faults have not been brought to the attention of the Procurement Officer, in writing, at least ten days before the time set for opening.

Section 1.06 Protests and Appeals

Any protest or appeal of the award of the Agreement must be in writing and received by the Purchasing Director within seven days of the County Administrator's decision. The written communication must list the specific areas of protest and suggested remedy. The decision of the Purchasing Director on any protest or appeal shall be final.

Section 1.07 Inquiries - Clarifications

Any information obtained from an officer, agent or employee of the Unified Government or any other person shall not modify or change the Contract Documents and shall not affect the risk or obligation assumed by the Offeror or relieve him from fulfilling any of the conditions of the Contract Documents. Should an Offeror be in doubt as to the meaning of any provisions of the Contract Documents, he may submit to the Unified Government a written request for an interpretation. Any written request for interpretation shall be submitted to the Unified Government no later than seven days from the date set for receipt of proposals. Any interpretation of the Contract Documents shall be made by amendment.

Any questions regarding the Contract Documents shall be directed in writing to the attention of the Procurement Officer via email, to the Office of Procurement and Contract Compliance ATTN: Teresa Houchins (thouchins@wycokck.org), Room 649, 701 North 7th Street, Kansas City, Kansas 66101. All questions must be received no later than the date established in the project timetable. Telephone conversations must be confirmed in writing by the interested party.

Two types of questions generally arise. One may be answered by directing the questioner to a specific section of the Contract Documents. These questions may be answered over the telephone. Other questions may be more complex and may require a written amendment to the Contract Documents. The Procurement Officer will determine the appropriate method to be used.

Section 1.08 Amendments

The Unified Government may issue amendments to the Contract Documents prior to the time for receipt of Proposals. The Offeror shall acknowledge receipt of all amendments by executing and submitting them with the Proposal on the Price Proposal form. Amendments will only be issued to potential Offerors known to have the RFP. All postponements of the opening date of Proposals shall be effectuated by amendment.

Section 1.09 Alternate Proposals

Deviations from the requirements and specifications are permitted but must be noted separately explaining the nature of the deviation. When listing deviations, refer to the specific provision(s) to which the deviation pertains. Unless a deviation is expressly stated, the Proposal shall be evaluated as if it meets ALL specifications, and the Offeror submitting the Proposal shall be required to perform all services as required by the Contract Documents.

Section 1.10 Implied Requirements

By submission of the Proposal, the Offeror certifies all services proposed meet or exceed all requirements as set forth in the Contract Documents, unless the Proposal specifically states otherwise. Any products and services that are not specifically addressed in the Contract Documents, but which are necessary to provide functional capabilities proposed by the Offeror must be included in the Proposal.

Section 1.11 Project Timetable and Contract Term

The project timetable set out herein represents the Unified Government's best estimate of the schedule that will be followed. If a component of the schedule, such as the opening date, is delayed, the rest of the schedule may be shifted by the same number of days.

- Issue RFP: July 5, 2024
- Pre-Proposal Conference: July 23, 2024, 8:30 am CST
- Last day for Questions: August 1, 2024, 2:00 pm CST
- Proposals Due: August 8, 2024, 2:00 pm CST
- Selected Offeror Notified of Selection: August 23, 2024
- Notice of Award: August 30, 2024
- Notice to Proceed: September 27, 2024

The contract(s) resulting from this RFP will be effective for the approximate twelve-month period from the date of the Notice to Proceed. The Unified Government reserves the sole right to renew the contract(s) for four additional twelve-month periods.

Section 1.12 Location of Work

The location(s) the Work is to be performed is at various locations throughout Wyandotte County within the Water Pollution Control Division sewer service area as shown on the Contract Drawings.

Offerors shall visit the site of work and existing facilities and shall fully inform themselves of existing conditions and limitations. Responsibility for differing site conditions shall be determined in accordance with Section 16 of the General Conditions. Offeror shall study all reports of subsurface exploration and other technical data which may be identified in the Contract Documents. Offeror shall be familiar with all federal, state, and local laws and regulations that may affect cost, progress, or performance of the work. Offeror shall prepare Proposal from complete Contract Documents.

Section 1.13 Proposals and Presentation Costs

The Unified Government will not be liable in any way for any costs incurred by the Offeror in the preparation of their Proposal in response to the RFP nor for the presentation of their Proposal and/or participation in any discussions, interviews, or negotiations.

Section 1.14 Disclosure of Proposal Contents

All Proposals and other material submitted become the property of the Unified Government and may be returned only at the Unified Government's option. Kansas Open Records Act requires public records to be open to reasonable inspection. All Proposal information, including detailed price and cost information, will be held in confidence during the evaluation process and prior to the time a Notice of Award is issued. Thereafter, Proposals will become public information.

Trade secrets and other proprietary data contained in Proposals may be held confidential if the Offeror requests, in writing, that the Procurement Officer does so, and if the Procurement Officer agrees, in writing, to do so. Material considered confidential by the Offeror must be clearly

identified and the Offeror must include a brief statement that sets out the reasons for confidentiality.

Section 1.15 Cooperative Procurement

If the Offeror has indicated agreement to participate in the Cooperative Procurement Program in the Proposal Questionnaire, the Offeror shall provide equipment, supplies, and/or services as described herein under the terms and conditions, requirements and specifications of the contract, including prices, to other entities. The Offeror shall further understand and agree that participation by other entities is discretionary on the part of that entity and the Unified Government bears no financial responsibility for any payments due the Offeror by such entities.

Section 1.16 Independent Contractor Relation

Nothing in this Agreement shall be construed to create a relationship of employer and employee or principal and agent or any other relationship other than that of independent parties contracting with each other solely for the purpose of carrying out the provisions of this Agreement. Nothing in this Agreement shall create any right or remedies in any third party.

The Agreement to be entered into is not intended to be, and will not constitute or otherwise recognize a joint venture, partnership agreement or relationship, or formal business organization or association of any kind between the parties; and, the rights and obligations of the parties shall be only those expressly set forth in the Agreement. The parties will agree that no persons supplied by the Offeror in performance of the contract are employees of the Unified Government and further agree that no right of the Unified Government's civil service, retirement, or personnel rules accrue to such persons. The Offeror shall have the total responsibility for all salaries, wages, workers' compensation insurance, unemployment compensation, bonuses, retirement, withholdings, other benefits, and all taxes and premiums appurtenant thereto concerning such persons and shall hold the Unified Government harmless with respect thereto.

Section 1.17 Determination of Responsibility and Responsiveness

Per Section 29-198 (Duty Concerning Responsibility), before awarding a contract the Procurement Officer must be satisfied that the Offeror is responsible. All Offerors shall supply information as requested by the Procurement Officer concerning the responsibility of such Offeror. The determination of responsibility shall be governed by Section 29-198 of the Unified Government's Procurement Code and Regulations. The contract file shall contain the basis on which the award is made.

Offeror's not complying with all of the requirements contained in the Legal Notice of Request for Proposal and the Contract Documents may be judged nonresponsive. Offeror's responsibility or non-responsibility shall be determined under Section R3-301 of the Procurement Regulations. Offerors shall supply information as requested by the Procurement Officer concerning the responsibility of such Offeror. The Unified Government may waive informalities in its determination of responsiveness and responsibility.

Section 1.18 Evaluation

The Proposal Evaluation Committee shall evaluate all Proposals submitted and shall classify them as: acceptable, potentially acceptable (that is reasonably susceptible of being made

acceptable), or unacceptable. Offerors whose proposals are unacceptable shall be notified promptly. More detailed evaluation information is found in Article VII of this RFP.

Section 1.19 Equal Treatment

Offerors will be accorded fair and equal treatment with respect to any opportunity for discussions and revisions of Proposals. The Procurement Officer will establish procedures and schedules for conducting discussions. If during discussions there is a need for any substantial clarification of or change in the RFP, the RFP shall be amended to incorporate such clarification or change. Auction techniques (revealing one Offeror's price to another) and disclosure of any information derived from competing Proposals are prohibited.

Section 1.20 Award

The contract shall be awarded in whole or in part to the responsible Offeror whose Proposal is determined to be the most advantageous to the Unified Government taking into consideration all the evaluation factors set forth in the RFP. No other factors or criteria shall be used in the evaluation.

The County Administrator retains the sole and complete discretion to select the successful Offeror based upon the evaluation of the Proposal Evaluation Committee's recommendation. The decision of the County Administrator will be final unless an appeal is filed as described in Section 1.05 of the RFP.

The contract, if awarded, will be on the basis of materials and equipment specified or described in the Contract Documents without consideration of possible substitute or "or-equal" items. Application for review of substitute or "or-equal" materials or equipment will not be considered by Engineer and Owner until after the Effective Date of the Agreement. The procedure for submission of any application for review of substitute or "or-equal" items by Offeror and consideration by Engineer and Owner is set forth in Section 8 of the General Conditions.

Section 1.21 Notification of Award

Written notice of award shall be sent to the successful Offeror. The successful Offeror shall, within ten days from the date of receipt of the notice of award, perform the following:

- If the contract is in excess of \$50,000, submit a labor and material payment bond to the State of Kansas in the amount of 100% of the price specified in the Contract Documents.
- If the contract is in excess of \$50,000, submit a performance bond in the amount of 100% of the Contract Price.
- If the Offeror is not a corporation or a resident of the State of Kansas, submit an executed copy of the Appointment of Process Agent Form which has been filed in the office of the Clerk of the Wyandotte County District Court.
- If the Offeror is a foreign corporation, has applied to and been authorized by the Kansas Secretary of State to do business in Kansas in accordance with K.S.A. 17-7301 et seq., has a resident agent in the State of Kansas, execute the Foreign Corporation Resident Agent Designation form.

- Submit a certificate of insurance evidencing insurance as required by the Contract Documents (Section 27 - General Conditions).
- Execute the Agreement.
- Ensure that all occupation taxes and fees are paid in full. Offerors are hereby directed to contact the Unified Government of Wyandotte County / Kansas City, Kansas License Division at (913) 573-8780 for information regarding Licensing and Occupational Taxes.
- The successful Offeror shall come into compliance with chapter 11 of the Procurement Code and Regulations regarding Affirmative Action and Equal Employment Opportunity as required by Sections 18-86 and 18-87 of the Code of Ordinances of the Unified Government of Wyandotte County / Kansas City, Kansas. For information regarding compliance requirements, contact the Contract Compliance Division located on the 6th Floor of the Municipal Office Building, 701 N. 7th Street, Kansas City, Kansas 66101, Room 649 or call (913) 573-5440.
- All bonds required shall contain all terms and conditions contained in the provided bond forms and shall be executed by a surety company authorized to do business in the State of Kansas and countersigned by an agent licensed by the Unified Government. The attorney in fact who signs bonds must file with each bond a certified and effective dated copy of their power of attorney.
- The Unified Government of Wyandotte County / Kansas City, KS; Johnson County, KS; City of Kansas City, MO; and Jackson County, MO (collectively the "Local Governments"), have agreed to cooperate with each other to ensure that tax funded contracts are performed by Contractors in compliance with the Tax Laws of the Local Governments. Offeror agrees that the Offeror shall be in compliance with the respective Tax Laws of the Local Governments throughout the term of this contract and any contract renewals and that proof of Offeror's compliance with the Tax Laws of the Local Governments shall be a condition of award. All Offerors entering into a contract and all subsequent renewals with the Unified Government of Wyandotte County in the amount of \$20,000.00 or more must obtain a Tax Clearance Certification. The Tax Clearance Certification must be signed by an authorized official from all four (4) of the "Local Governments" and submitted to the Unified Government Procurement and Contract Compliance Department. The Tax Clearance Certification shall be valid for a period of one year from the date of issuance and shall not be dated more than sixty (60) days prior to any notice of intent to contract by the County. For information, instructions, and forms regarding compliance requirements, contact the Contract Compliance Division located on the 3rd Floor of the Municipal Office Building, 701 N. 7th Street, Kansas City, Kansas 66101, Room 318 or call (913) 573-5443.

Section 1.22 Right to Reject Proposals

The Unified Government reserves the right without contest to accept or reject any Proposals or alternate Proposals. Offerors must comply with all the terms of the Contract Documents, the Unified Government Procurement Code, and all applicable local, State, and federal laws, codes, and regulations. The Procurement Officer may reject any Proposal that does not comply with all of the material and substantial terms, conditions, and performance requirements of the Contract

Documents.

Offerors may not restrict the rights of the Unified Government or qualify their Proposal. If an Offeror does so, the Procurement Officer may determine the proposal to be a non-responsive counter-offer and the proposal may be rejected.

The Unified Government reserves the right to waive minor irregularities in a Proposal and to correct obvious mathematical errors on a Price Proposal form. Minor irregularities may be waived by the Procurement Officer if determined that they:

- do not affect responsiveness;
- are merely a matter of form or format;
- do not change the relative standing or otherwise prejudice other offers;
- do not change the meaning or scope of the RFP or Contract Documents;
- are trivial, negligible, or immaterial in nature;
- do not reflect a material change in the Work; or,
- do not constitute a substantial reservation against a requirement or provision.

If no Offerors meet all the mandatory requirements of the RFP, or if sufficient funds are not available, or if other extenuating circumstances prevail, the Unified Government may choose to make no award and to submit a revised RFP to Offerors at a later date, or may choose to negotiate with those submitting Proposals.

Section 1.23 Mistakes in Proposals Discovered Prior to Award

At any time prior to the specified date and time for submission, an Offeror may withdraw or modify a Proposal in accordance with Section R3-103.10 of the Unified Government's Procurement Code Regulations. Any Proposal modification must be in writing, executed by an authorized person, and submitted prior to the Proposal submission date. The Unified Government will deal with mistakes in Proposals according to Section R3-103.15 of the Unified Government's Procurement Code Regulations.

Section 1.24 Mistakes in Proposals Discovered After Award

The Unified Government will deal with mistakes in Proposals according to Section R3-103.15 of the Unified Government's Procurement Code Regulations.

Section 1.25 Notice to Proceed

The Unified Government, within thirty (30) days of Offerors' compliance with all the conditions contained in Section 1.20, shall sign and return to the Offeror a photocopy of the executed Agreement. Should the Unified Government not execute the Agreement within thirty (30) days period, the Offeror may by written notice withdraw his signed Agreement. Such notice of withdrawal shall be effective upon receipt of notice by the Unified Government.

The Notice to Proceed will be issued within thirty (30) days of the execution of the Agreement by the Unified Government. Should there be reasons why the Notice to Proceed cannot be issued within such period, the time may be extended by mutual agreement between the Unified Government and the Offeror. If the Notice to Proceed has not been issued within the thirty (30) day period or within the period mutually agreed upon, the Offeror may, by Written Notice, terminate the

Agreement without further liability on the part of either party.

Section 1.26 Ownership of Reports, Drawings, Specifications, etc.

All reports, drawings, designs, specifications, notebooks, tracings, photographs, negatives, findings, recommendations, data and memoranda of every description relating to the services described herein and in completion thereof, shall be the property of the Unified Government.

Article II. Standard Contract Information

Section 2.01 *Contract Type*

This contract is a Unit Price contract. The Price Proposal consists of a unit price tabulation for one or more geographical sites and single grand total. Comparison of Price Proposals will be based on the grand total.

This contract may be awarded to more than one Offeror to ensure resources are available when they are needed.

Section 2.02 *Contract Approval*

This RFP does not, by itself, obligate the Unified Government. The Unified Government's obligation will commence when the contract is approved by the Unified Government County Administrator, the Administrator's designate, or the Procurement Officer. Upon written notice to the Offeror, the Unified Government may set a different starting date for the contract. The Unified Government will not be responsible for any work done by the Offeror, even work done in good faith, if it occurs prior to the contract start date set by the Unified Government.

Section 2.03 *Proposal as a Part of the Contract*

This RFP and the successful Proposal will be incorporated into the contract.

Section 2.04 *Additional Terms and Conditions*

The Unified Government reserves the right to add terms and conditions during contract negotiations. These terms and conditions will be within the scope of the RFP and will not affect the Proposal evaluations.

Section 2.05 *Insurance Requirements*

The successful Offeror must secure the insurance coverage required by the Unified Government as detailed in Section 27 of the General Conditions for each project Authorization. The coverage must be satisfactory to the Division of Risk Management. An Offeror's failure to provide evidence of such insurance coverage is a material breach and grounds for withdrawal of the award or termination of the contract.

The successful Offeror shall either ensure that all subcontractors are covered under Offeror's insurance or require all subcontractors maintain insurance meeting all the requirements stated herein. Offeror shall further ensure that the additional insured requirements of Offeror as noted herein are met by an subcontractors.

Section 2.06 *Minority and Women Owned Business Participation*

Project goals for MBE/WBE participation are NOT part of this solicitation.

Along with the Proposal, all Offerors must submit, on the form provided, a completed Affidavit of Intended Utilization, listing the names of Subcontractors and Suppliers proposed for use and

designating which Work each is to perform. **Affidavit of Intended Utilization is required whether or not project goals are established.**

The Unified Government encourages solicitations from local-, minority-, and women-owned businesses, on all projects whether or not project goals are established. Offerors may access a listing of L/M/WBE firms by visiting www.wycokck.org and clicking the link titled "Supplier Database."

When a project goal for participation by MBEs or WBEs is established, additional submittals are required. These additional requirements are located in the Additional Requirements when MBE/WBE Goals are Established of the Contract Documents.

Section 2.07 Bonds

The successful Offeror shall obtain the required bonds for each project Authorization.

Labor and Material Payment Bond

If the contract is in excess of \$50,000, the successful Offeror shall submit a labor and material payment bond to the State of Kansas in the amount of 100% of the price specified in the Contract Documents for the protection of all persons supplying labor, materials, equipment and supplies to the contractor or its subcontractor. Said bond shall comply with the requirements of K.S.A. 60-1111, as amended, and shall be filed with the Clerk of the District Court of Wyandotte County, Kansas.

Performance Bond

Where the contract is in excess of \$50,000, the successful Offeror shall furnish the Unified Government with a Performance Bond in the amount of 100% of the Contract Price. The Performance Bond shall be conditioned upon the performance by the Offeror of all undertakings, covenants, terms, conditions, and agreement of the Contract Documents.

Maintenance Bond

The successful Offeror shall furnish the supplied Maintenance Bond in an amount equal to 25% of the total Contract Price holding good for a period of three (3) years after the final acceptance of the Work. The maintenance bond shall protect the Unified Government against all damages, losses and expenses which may occur to the Unified Government, by reasons of defective materials used, or by reason of defective workmanship done, for, and the construction of, said work; and shall refill all excavation in such manner that it shall be, and shall remain, for the said period of three (3) years, flush with the surfaces of streets and adjacent property, and shall repair for said period of three (3) years, all pavements, walks, curbs, gutters, and sodding over and adjacent to said Work if such items are damaged as the result of settlement of backfill of excavated areas. If any items covered by the maintenance bond are not repaired or replaced by the Offeror within a reasonable time, as determined by the Unified Government or if a hazard occurs as the result of disrepairs, the Unified Government shall have the right to correct, or have corrected such disrepair, at the expense of the Offeror or Bonding Company.

Such bond shall be executed by a surety company authorized to do business in the State of Kansas and requires the appointment of a Kansas Resident Agent. Such bond shall be furnished by the Contractor immediately following the completion of the project and acceptance thereof by the Unified Government.

Section 2.08 Contract Pricing

The prices provided by the successful Offeror(s) in the Price Proposal shall remain firm during the initial contract period. Prices for contract renewal periods shall be negotiated and mutually agreed upon by the successful Offeror(s) and the Unified Government. Updated pricing due to changes in the cost of labor and/or materials shall include documented justification for price increases and be submitted at least eight weeks prior to the contract period expiration date.

Any contract entered into will be of the “open end” type. The successful Offeror(s) will deliver such quantities as may be ordered, and the contract shall be binding only for the actual quantities ordered during the contract period. Orders will be issued throughout the contract period as needs are determined.

Section 2.09 Payment Procedures

The Unified Government will make payments in accordance with Section 25 of the General Conditions.

Section 2.10 Proposed Payment Option

A Virtual Payment Option is available. Contact Debbie Tipton, Accounts Payable, 913-573-5256, for additional information.

Section 2.11 Contract Personnel

Any change of the project team members named in the Proposal must be approved, in advance and in writing, by the Contracting Officer. Personnel changes that are not approved by the Unified Government may be grounds for the Unified Government to terminate the contract.

Section 2.12 Liquidated Damages

The Unified Government will assess liquidated damages in accordance with the Agreement and Section 24 of the General Conditions.

Section 2.13 Contract Changes

Changes in the Work will be addressed in accordance with Section 13 of the General Conditions.

Article III. Required Contractual Terms and Conditions

In addition to the terms and conditions in the Contract Documents, including the General Conditions, the following terms and conditions must be agreed to by the successful Offeror and are hereby made a part of the contract entered into between the Unified Government and the successful Offeror, unless specifically modified in writing:

1. **Governing Law.** This Agreement is subject to, governed by, and construed according to the laws of the State of Kansas.
2. **Compliance with Law.** Offeror shall comply with all applicable local, state, and federal laws and regulations in carrying out this Agreement, regardless of whether those legal requirements are specifically referenced in this Agreement.
3. **Authority To Contract.** Offeror represents that it possesses legal authority to contract, that it has undertaken any official action required by its governing documents to enter into this Agreement, that its undersigned representative is duly authorized to execute this document on its behalf, that it agrees to be bound by all the provisions of this Agreement, and that the person identified as its official representative is authorized to act on its behalf in the implementation of this Agreement.
4. **Modification of Agreement.** This Agreement may be modified or amended only in writing executed by both parties and will be subject to renegotiation in the event of changes to applicable law, rules, or regulations affecting the subject matter of this Agreement.
5. **Cash Basis Law.** This Agreement is subject to the Kansas Cash Basis Law, K.S.A. 10-1101 et seq. and amendments thereto. Any automatic renewal of the terms of the Agreement shall create no legal obligation on the part of the Unified Government. This Agreement shall be construed and interpreted so as to ensure that the Unified Government shall at all times stay in conformity with such laws and, as a condition of this Agreement, the Unified Government reserves the right to unilaterally sever, modify, or terminate this Agreement at any time if, in the opinion of its legal counsel, the Agreement is deemed to violate the terms of such law. The Unified Government is obligated only to pay periodic payments or monthly installments under the Agreement as may lawfully be made from (a) funds budgeted and appropriated for that purpose during the Unified Government's current budget year or (b) funds made available from any lawfully operated revenue producing source.
6. **Payment of Taxes.** The Unified Government shall not be responsible for, nor indemnify Offeror for any federal, state, or local taxes which may be imposed or levied upon the subject matter of this Agreement. If applicable, Offeror shall pay the Unified Government occupation tax prior to execution of the Agreement.
7. **Licenses and Permits.** Offeror shall maintain all licenses, permits, certifications, bonds, and insurance required by federal, state, or local authority for carrying out this Agreement. Offeror shall notify the Unified Government immediately if any required license, permit, bond, or insurance is cancelled, suspended, or is otherwise ineffective.

Such cancellation, suspension, or other ineffectiveness may form the basis for immediate termination by the Unified Government in its discretion.

8. Independent Contractor Relation. The parties agree that the legal relationship between them is of a contractual nature. Nothing in this Agreement shall be construed to create a relationship of employer and employee or principal and agent or any other relationship other than that of independent parties contracting with each other solely for the purpose of carrying out the provisions of this Agreement.

Nothing in this Agreement shall create any right or remedies in any third party. The parties agree that no persons supplied by Offeror are employees of the Unified Government and that no right of the Unified Government's civil service, retirement, or personnel rules accrue to such persons. The Unified Government shall not be responsible for withholding of social security, workers compensation insurance, unemployment compensation, bonuses, retirement benefits, other benefits, and any taxes and premiums from any payments made by the Unified Government to Offeror.

9. Discrimination in Delivery of Services Prohibited. During the performance of this Agreement, Offeror shall deny none of the benefits or services of the program to any eligible participant on the basis of race, religion, color, sex, disability, age, national origin, or ancestry.

10. Equal Opportunity and Affirmative Action.

- a. Offeror shall observe the provisions of the Kansas Act Against Discrimination, K.S.A. 44-1001 et seq. and amendments thereto, and shall not discriminate against any person in the performance of work under this Agreement because of race, religion, color, sex, disability, age, national origin, or ancestry.
- b. Offeror will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to race, religion, color, sex, disability, age, national origin, or ancestry. Such action shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. Offeror agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Unified Government setting forth the provisions of this nondiscrimination clause.
- c. Offeror, in all solicitations or advertisements for employees placed by or on behalf of Offeror, will state that all qualified applicants will receive consideration for employment without regard to race, religion, color, sex, disability, age, national origin, or ancestry.
- d. Offeror will cause the foregoing provisions to be inserted in all subcontracts for any work covered by this Agreement so that such provisions will be binding upon each subcontractor.
- e. Offeror shall assure that it and all subcontractors will implement the certificate of compliance in connection with this Agreement.
- f. If Offeror fails, refuses, or neglects to comply with the terms of these contractual conditions, such failure shall be deemed a total breach of the contract and this

Agreement may be terminated, canceled, or suspended, in whole or in part, and Offeror may be declared ineligible for any further Unified Government contracts for a period of up to one year. Provided that, if a contract is terminated, canceled, or suspended for failure to comply with this section, Offeror shall have no claims for damages against the Unified Government on account of such termination, cancellation, or suspension or declaration of ineligibility.

- g. Offeror shall maintain sufficient records to document that, under all aspects of this Agreement, it has acted in a manner which is in full compliance with the Kansas Act Against Discrimination. Such records shall at all times remain open to inspection by the Kansas Human Rights Commission or by the Unified Government.
 - h. Offeror, in carrying out this Agreement, shall also comply with all other applicable existing federal, state, and local laws relative to equal opportunity and nondiscrimination, all of which are incorporated by reference and made a part of this Agreement.
- 11. Waiver of Breach. The waiver by either party of a breach of any provision of this Agreement will not operate or be construed as a waiver of any subsequent breach by such party.
- 12. Severability. If a court of competent jurisdiction declares any part of this Agreement to be invalid, the balance of the Agreement will remain valid and enforceable.
- 13. Entire Agreement. This Agreement and its attachments set forth the parties' entire agreement. Neither party has made any oral or side agreements or representations not contained in this Agreement. This is a legal document and not a mere recital and is binding upon the parties, their representatives, and successors in interest.
- 14. Kansas Legal Requirements.
 - a. If the Successful Offeror is a Contractor (as defined in K.S.A. 79-1008) who is a nonresident of Kansas, Contractor shall comply with one of the following:
 - i. Authorization: If Contractor is a foreign corporation duly authorized to do business in this state (K.S.A. 17-7301 et. seq.), a copy of the Authorization issued by the Kansas Secretary of State valid for the year in which the construction is commenced, shall be filed with Unified Government prior to commencement of construction.
 - ii. Registration of Contract: If the total Contract Price or compensation exceeds \$10,000, nonresident Contractors not duly authorized to do business in this state in accordance with K.S.A. 17-7301 et. seq. shall register with the Director of Revenue of the state of Kansas in accordance with the provisions of K.S.A. 79-1009. Proof of such registration and proof of filing of the bond required by K.S.A. 79-1010 shall be filed with Unified Government prior to commencement of construction.
 - b. In addition, all Offerors whose domicile is located outside the state of Kansas shall furnish the Unified Government with a copy of their state's preferential bidding statutes and the applicable percentage received by in-state bidders from the state in which the contract is located.

- c. To the extent permitted by federal law and regulations, whenever the state of Kansas or any agency, department, bureau or division thereof or any municipality of the state, including, but not limited to, county, school district, improvement district, or other public body lets Bids for Contracts for the erection, construction, alteration, or repair of any public building or structure or any addition thereto or for any public work or improvement, the Bidder domiciled outside the state of Kansas, to be successful, shall submit a Bid the same percent less than the lowest Bid submitted by a responsible Kansas Bidder as would be required of such Kansas domiciled Bidder to succeed over the Bidding contractor domiciled outside Kansas on a like contract let in such Bidder's domiciliary state and in accordance with K.S.A. 75-3740a.
- d. Contractors who are not residents of the state in which the Work is to be performed are required to appoint an agent for service of process who is a resident of that state. It is unlawful for any payment to be made until the appointment of a local agent has been filed with the Clerk of the District Court (K.S.A. 16-113).

15. Outside Funding Source Requirements

- a. The Unified Government may fund certain projects under this term and supply contract using a State Revolving Fund (SRF) loan from the Kansas Department of Health and Environment (KDHE). Federal law requires that contracts relating to such funded projects include certain provisions. Depending upon the type of work or services provided and the dollar value of the projects, some of the provisions set forth in Section 16 below and the KDHE SRF Contract Provisions may apply to the Offeror's services provided under this contract.
- b. For work performed by the Offeror for projects funded by the Unified Government using an SRF loan from the KDHE, to the extent that the provisions are applicable to the work performed by the Offeror, the Offeror agrees to comply with the KDHE SRF Contract Provisions. Projects funded by the Unified Government using an SRF loan will be identified by the Unified Government.

16. Kansas Department of Health and Environment Requirements.

- a. The KDHE issues permits for storm water discharges through the National Pollutant Discharge Elimination System under the Clean Water Act. For any land disturbance activities that impact one or more acres, a permit must be obtained from the KDHE.
- b. Bidders on this work, including sub-contractors or vendors, will be required to comply with the Kansas Act Against Discrimination (K.S.A. 44-1001 et. seq.) and the Kansas Age Discrimination in Employment Act (K.S.A. 44-1111 et. seq.).
- c. All contracts and subcontracts exceeding \$100,000 at any tier under a KWPCRF Loan Agreement shall comply with the Anti-Lobbying Act, Section 319 of Public Law 101-121, and file an Anti-Lobbying Certification Form, and the Disclosure of Lobbying Activities form, if required, to the next tier above.

- d. The Successful Bidder shall secure the right of entry to the project site for representatives of the KDHE, so they may have access to the work whenever it is in preparation or progress and also to any books, documents, papers and records of the Contractor which are directly pertinent to that specific contract for the purpose of making audit, examinations, excerpts and transcriptions. Proper facilities and safe conditions must be provided for access and inspection, including advice regarding site safety procedures and programs to allow compliance.
- e. Bidders on this work will be required to comply with the President's Executive Order No. 11246 (Equal Employment Opportunity) as amended. Requirements for Bidders and Contractor s under this order are explained in the Specification.
- f. Bidders must fully comply with Subpart C of 2 CFR Part 180 and 2 CFR Part 1532, entitled Responsibilities of Participants Regarding Transactions. Contractors, Subcontractors, or suppliers that appear on the Excluded Parties List System at www.sam.gov are not eligible for award of any contracts funded by the KDHE State Revolving Fund programs.

Article IV. Standard Proposal Information

Section 4.01 *Proposal Content*

Proposals shall consist of two separate submittals: a Price Proposal and a Proposal Questionnaire as detailed in Sections V and VI of this RFP.

Section 4.02 *Authorized Signature*

PROPOSALS WILL NOT BE CONSIDERED UNLESS AN OFFICER AUTHORIZED TO BIND THE OFFERING COMPANY TO THE PROVISIONS OF THE CONTRACT DOCUMENTS SIGNS THE SIGNATURE PAGE.

Proposals must remain open and valid for at least ninety (90) days from the opening date.

Section 4.03 *Mandatory Pre-Proposal Conference*

A **MANDATORY** Pre-Proposal Conference will be held at **8:30 am**, Central Standard Time, on **July 23, 2024**, in the **large** conference room (Room 207) on the **second** floor of the **Kaw Point WWTP Administration Building** located at **50 Market Street**. The purpose of the conference is to discuss the work to be performed with the prospective Offerors and allow them to ask questions concerning the RFP and Contract Documents. Questions and answers will be transcribed and sent to prospective Offerors as soon as possible after the meeting.

Offerors with a disability needing accommodation should contact the Procurement Officer prior to the date set for the Pre-Proposal Conference so that reasonable accommodation can be made.

Section 4.04 *Proposal Submittal*

SEALED PROPOSALS MUST BE RECEIVED AT THE OFFICE OF THE UNIFIED GOVERNMENT CLERK, 3RD FLOOR, MUNICIPAL OFFICE BUILDING, 701 NORTH SEVENTH STREET, KANSAS CITY, KANSAS, NO LATER THAN THE DATE AND TIME LISTED IN THE LEGAL NOTICE OF REQUEST FOR PROPOSAL. LATE PROPOSALS WILL NOT BE CONSIDERED.

It is the Offeror's responsibility to ensure Proposals are received by the closing date and time. Delays in mail delivery or any other means of transmittal, including couriers or agents of the issuing entity, shall not excuse late submissions. Offerors shall be responsible for actual delivery of the Proposal to the appropriate department identified in the Legal Notice of Request for Proposal.

Section 4.05 *Supplemental Terms and Conditions*

Proposals including supplemental terms and conditions will be accepted, but supplemental conditions that conflict with those contained in this Contract Documents or that diminish the Unified Government's rights under any contract resulting from the Contract Documents will be considered null and void. The Unified Government is not responsible for identifying conflicting supplemental terms and conditions before issuing a contract award. After award of contract:

[a] if conflict arises between a supplemental term or condition included in the Proposal and a term or condition of the Contract Documents, the term or condition of the Contract Documents will prevail; and

[b] if the Unified Government's rights would be diminished as a result of application of a supplemental term or condition included in the Proposal, the supplemental term or condition will be considered null and void.

Section 4.06 *Discussions with Offerors*

The Unified Government may conduct discussions with Offerors for the purpose of clarification. The purpose of these discussions will be to ensure full understanding of the requirements of the RFP and Proposal. Discussions will be limited to specific sections of the RFP identified by the Procurement Officer. Discussions may only be held with Offerors who have submitted a Proposal deemed reasonably susceptible for award by the Procurement Officer. Discussions, if held, will be after initial evaluation of Proposals by the Proposal Evaluation Committee. If modifications are made as a result of these discussions, they will be put in writing. Following discussions, the Procurement Officer may set a time for best and final Proposal submissions from those Offerors with whom discussions were held. Proposals may be reevaluated after receipt of best and final Proposal submissions. Reevaluation will be limited to the specific sections of the RFP opened to discussion by the Procurement Officer.

Offerors with a disability needing accommodation should contact the Procurement Officer prior to the date set for discussions so that reasonable accommodation can be made.

Section 4.07 *Prior Experience*

In order for their Proposals to be considered responsive, Offerors (and/or their subcontractors) must meet these minimum prior experience requirements:

1. The Offerors must have the capability to perform the types of work outlined in the scope and Price Proposal, utilizing subcontractors as necessary. To demonstrate this capability, respondents to the RFP should meet the following minimum experience qualifications:
 - a. Prime Contractor should have minimum five (5) years' experience in wastewater and/or stormwater collection system repair and replacement construction as a prime contractor. Experience should include major construction with large diameter pipe, deep excavations requiring shoring, bypass pumping, stream crossing repairs and restoration, and force main repairs.
 - b. Prime Contractor's Project Manager(s) and Superintendent(s) to be assigned to the project should each have a minimum 10 years' experience in wastewater and/or stormwater collection system construction, including a minimum five (5) years in these respective positions.
 - c. Prime Contractor shall have successfully completed at least three (3) wastewater and/or stormwater collection system projects within the past five years. Total construction value for all projects should be at least \$1.5 million.
 - d. Prime Contractor should be located within an approximate 1-hour drive of Wyandotte County, Kansas, or approximately 50 miles.
 - e. Prime Contractor shall be available to provide service seven (7) days a week,

- twenty-four (24) hours a day.
- f. Prime Contractor shall have sufficient resources (workforce, supervision, equipment, and financial) necessary to perform the Work of the Specifications and/or requests. To confirm payment for equipment, Contractor may be required to submit specific makes, models, and classifications of equipment used for the work.
2. Specification Section 2533, Paragraph 1.07, A.1.: The Contractor and Contractor's staff shall have experience completing various manhole rehabilitation Work items. The Contractor shall be certified by the manufacturer of a particular item to be incorporated into the Work that said Contractor is a fully trained user of the item. Personnel directly involved in applying or installing the item shall receive training in the proper methods for handling and installing the item. Training shall be performed by a qualified representative.
 3. Specification Section 5300, Paragraph 1.06, B.1.: The CIPP lining installer must satisfy all insurance, financial, and bonding requirements of the Owner, and must have been in the CIPP business for at least two (2) years. In addition, the installer must have successfully installed at least 2,000,000 feet of small diameter (6"-12"), 750,000 feet of medium diameter (15"-30"), and 250,000 feet of large diameter (>30") of the product bid in wastewater collection systems within the preceding 10 years. The installer's onsite superintendents designated for this project must have had at least five (5) years of continuous active experience in the commercial installation of CIPP, and have been employed by the installer for no less than the past twelve (12) months.
 4. Specification Section 2532, Paragraph 1.03, A.: The Contractor shall be certified by the manufacturer of the particular manhole coating/lining that said company is a fully trained user of the application equipment. Personnel directly involved shall receive training in the proper methods for handling and installing the lining/coating. Training shall be performed by a qualified representative.
 5. Specification Section 2532, Paragraph 1.03, B.: The contractor and the contractor's staff shall have experience installing manhole cementitious liner and epoxy liner, with a minimum installation of 15,000 vertical feet of cementitious liner and 15,000 vertical feet of epoxy liner.

An Offeror's failure to meet and provide adequate documentation of these minimum prior experience requirements will cause their Proposal to be considered non-responsive and their Proposal will be rejected.

Section 4.08 *Evaluation of Proposals*

A Proposal Evaluation Committee made up of the Contracting Officer, a representative from the Legislative Auditor's Office, and at least one other Unified Government employee will evaluate Proposals. The evaluation will be based solely on the evaluation factors set out in Article VII of the RFP.

Section 4.09 Contract Negotiations

After completion of the evaluation, including any discussions held with Offerors during the evaluation, the Unified Government may elect to initiate contract negotiations. The option of whether or not to initiate contract negotiations rests solely with the Unified Government. If the Unified Government elects to initiate contract negotiations, these negotiations cannot involve changes in the Unified Government's requirements or the Offeror's Proposal which would, by their nature, affect the basis of the source selection and the competition previously conducted.

The Offeror will be responsible for all travel and per diem expenses related to contract negotiations.

Section 4.10 Failure to Negotiate

If the selected Offeror:

- fails to provide the information required to begin negotiations in a timely manner;
- fails to negotiate in good faith;
- indicates they cannot perform the contract within the budgeted funds available for the project; or
- the Offeror and the Unified Government, after a good faith effort, simply cannot come to terms;

the Unified Government may terminate negotiations with the Offeror initially selected and commence negotiations with the next highest ranked Offeror.

Article V. Proposal Questionnaire

Section 5.01 *Proposal Questionnaire Format and Content*

The Proposal Questionnaire package shall include the following documents:

- Proposal Questionnaire – utilize the Proposal Questionnaire document provided in the Contract Documents. A separate Proposal Questionnaire shall also be submitted for all proposed Subcontractors furnishing or performing Work having an estimated value in excess of 25 percent of the total proposal price, the Open Cut Excavation Subcontractor, the CIPP-Lining Subcontractor, and the Manhole Rehabilitation Subcontractor.
- Attachments – includes the attachments requested in the Proposal Questionnaire, including Proposed Construction Progress Schedule, resumes, and safety logs.
- Appointment of Process Agent Form
- Foreign Corporation Resident Agent Designation
- Acknowledge and Understand Contractor's Section 3 Requirements
- Contractor Section 3 Plan
- Certification of Bidder Regarding Section 3 and Segregated Facilities.
- Certification Regarding Government-Wide Restriction on Lobbying.
- Certification of Bidder Regarding Equal Employment Opportunity.
- State of Kansas Act Against Discrimination Contract Provision Certification Form.
- Demonstration of Compliance with DBE Good Faith Efforts Worksheet.
- Certification Regarding Lobbying (EPA Form 6600-06).
- American Iron and Steel Certification.

The Unified Government discourages overly lengthy and costly responses to the Proposal Questionnaire, however, in order for the Unified Government to evaluate Proposals fairly and completely, Offerors should follow the format provided and provide all of the information requested.

All Proposal Questionnaires shall be submitted on the printed Proposal Questionnaire, or photocopy thereof, included in the Contract Documents. All blank spaces must be filled in, in ink or typewritten, and the Proposal Questionnaire must be fully completed and executed when submitted. Only one executed copy of each Proposal Questionnaire is required. The Proposal Questionnaires shall be included together in one package.

Section 5.02 *Submittal*

One hard copy of the Proposal Questionnaires shall be submitted in sealed envelopes (separate from the Price Proposal), addressed to the Unified Government Clerk, Municipal Office Building, 701 North 7th Street, Suite 323, Kansas City, Kansas, 66101-3064. The outside of each sealed envelope containing a Proposal Questionnaire shall be plainly marked "Proposal Questionnaire" and shall state the name of the project, RFP R40989, and the name and address of the Offeror. If forwarded by mail, the sealed envelope containing the Proposal Questionnaire must be mailed inside another envelope to the addressee. The hard copy shall not be bound in any way. The submission shall also include one flash drive of the complete Proposal Questionnaire package in .pdf format.

Article VI. Price Proposal

Section 6.01 *Price Proposal Format and Content*

The Price Proposal package shall include the following documents:

- Price Proposal – utilize the Price Proposal document provided in the Contract Documents, required information includes acknowledgement of receipt of Amendments, Price, List of Manufacturers, and List of Subcontractors.
- Sample Project Price Proposal – utilize the Sample Project Price Proposal document provided in the Contract Documents.
- Affidavit of Intended Utilization – utilize the forms provided in the Contract Documents and submit the Affidavit of Intended Utilization as required in Section 2.06 of this RFP.
- Certification of Bonding Capacity - A notarized certification from the Offeror addressed to the Unified Government stating that the Offeror has bonding capacity of 20% of the annual maximum contract amount, or \$400,000, to dedicate to this contract.

All price proposals shall be submitted on the printed Price Proposal and Sample Project Price Proposal forms, or photocopies thereof, included in the Contract Documents. All blank spaces must be filled in, in ink or typewritten, and the forms must be fully completed and executed when submitted. Only one executed copy of each form is required. All other forms required to be submitted shall be completed by the Offeror and submitted with the Price Proposal form. The Price Proposal form, Sample Project Price Proposal form, and all required forms shall be included together in one package.

Standard unit rates shall be entered for the work types shown on the Price Proposal. The unit rates provided in the Price Proposal shall be used on the Sample Project Price Proposal, which will be used in the cost component of the proposal evaluations. The unit rates entered into the Price Proposal will become part of the contract for the successful Offeror and will remain in effect for the duration of the initial 12-month contract period. Adjustments to the unit rates may be negotiated for subsequent renewal periods as indicated in Section 2.08.

A previous scope of work package that is similar to the scope of the work that will be provided with a written project Authorization to the successful Offeror is provided in these Contract Documents for the Offeror's reference.

Section 6.02 *Submittal*

One hard copy of the Price Proposal package shall be submitted in sealed envelopes (separate from the Proposal Questionnaire), addressed to the Unified Government Clerk, Municipal Office Building, 701 North 7th Street, Suite 323, Kansas City, Kansas, 66101-3064. The outside of each sealed envelope containing a Price Proposal shall be plainly marked "Price Proposal" and shall state the name of the project, RFP R40989, and the name and address of the Offerer. If forwarded by mail, the sealed envelope containing the Price Proposal must be mailed inside another envelope to the addressee. The hard copy shall not be bound in any way. The submission shall also include one flash drive of the complete Price Proposal package in .pdf format.

Article VII. Evaluation and Selection

Section 7.01 General

The Proposals will be reviewed and evaluated by the Owner's Proposal Evaluation Committee (with assistance provided by outside advisors if desired by Owner) according to the requirements and criteria outlined in this Article VII. During the Proposal evaluation process, written questions or requests for clarification may be submitted to one or more Offerors regarding its Proposal or related matters. Failure to respond in a timely manner to any such questions or requests may be grounds for elimination of the Offeror from further consideration. In addition, the Owner may require that all or a limited number of Offerors participate in interviews.

Section 7.02 Responsiveness

Each Proposal will be reviewed to determine whether it is responsive to the RFP. Failure to comply with the requirements of this RFP may result in a Proposal being rejected as non-responsive. At its sole discretion, however, the Proposal Evaluation Committee may waive any such failure to meet a requirement of this RFP and may request clarification or additional information to remedy a failure.

Section 7.03 Evaluation Criteria and Selection Methodology

In ranking the Proposals, the Proposal Evaluation Committee will utilize a 1,000-point scale based on the responses provided on the Proposal Questionnaire organized under the following criteria:

- Financial Condition and Performance History
- Relevant Experience and Qualifications
- Project Approach
- Labor Compliance
- Safety Record

Each criterion will be given a raw score between 150 and 200 based on the following methodology:

OFFEROR SCORE EVALUATION METHODOLOGY		
ASSESSMENT	DESCRIPTION	RAW SCORE RANGE
Excellent	Exceeds the required standard. Response answers the question with precision and relevance. Includes improvement through innovation/added value.	191 - 200
Good	Meets the standard required. Comprehensive response in terms of detail and relevance to the question.	181 – 190
Acceptable	Meets the standard in most aspects but fails in some areas. Acceptable level of detail, accuracy, and relevance.	171 – 180
Limited*	Fails the standard in most aspects, but meets some. Limited information / inadequate / only partially addresses the question.	161 – 170
Inadequate*	Significantly fails to meet the standard. Inadequate detail provided / questions not answered / answers not directly relevant to the question.	151 – 160
Unacceptable*	Completely fails to meet the standard. Response significantly deficient / no response.	150
*If a criterion for an Offeror is given a score of 170 or less by more than one member of the Proposal Evaluation Committee, that entire Proposal will be declared nonresponsive and not considered for selection.		

The raw score for each criterion will then be adjusted based on the following weighting factors:

- Financial Condition and Performance History – 20%
- Relevant Experience and Qualifications – 25%
- Project Approach – 30%
- Labor Compliance – 5%
- Safety Record – 20%

The weighted scores for each criterion will be added together and normalized to a 1,000 point scale. The average of the weighted, normalized scores determined by the members of the committee will be the Offeror's Qualification Points. The maximum Qualification Points for any Offeror is 1,000 points.

The committee will apply the non-price evaluation and complete its awarding of the non-price criteria points before opening the sealed envelope containing the Price Proposal.

The total Sample Project Price Proposal amount is then divided by the Offeror's average Qualification Points resulting in a unit of measurement indicating dollars per quality point (\$/QP), also known as the Best Value Score (BVS). The Offeror with the lowest BVS is the apparent lowest responsible Offeror.

Section 7.04 Selection

The Unified Government shall evaluate the Proposals of all Offerors in accordance with the instructions prescribed in this RFP and in accordance with the Code of the Unified Government

of Wyandotte County/Kansas City, Kansas, Chapter 29, Section 29-316.

The Proposals shall be evaluated and assigned points in accordance with the requirements of the RFP. After the evaluation process is complete, the Owner will notify Offerors of the relative rankings.

The successful responsive Offeror (lowest BVS) shall be awarded the contract. If the Unified Government determines that it is not in the best interest of the Unified Government to proceed with the project pursuant to the Proposal offered by the successful firm, the Unified Government shall reject all Proposals. If all Proposals are rejected, the Unified Government may solicit new Proposals using different design criteria, budget constraints or qualifications.

If the Unified Government determines (at its sole discretion) that the unit prices and total price included in a Proposal are unacceptably below industry norms, that a Offeror's unit prices are substantially or unacceptably below other Proposals, or that a Offeror's unit prices are unbalanced or irregular (i.e., unit prices are skewed in a manner to artificially present a lower price for the Sample Project to take advantage of the cost evaluation), the Unified Government may (at its sole discretion) declare that Proposal to be nonresponsive or seek additional detailed information from that Offeror concerning the cost basis for its Price Proposal prior to rendering a decision on the Offeror's responsiveness.

UNIFIED GOVERNMENT OF WYANDOTTE COUNTY / KANSAS CITY, KANSAS

PROPOSAL QUESTIONNAIRE

The OFFEROR shall enter in the spaces provided the information requested below and shall submit this Proposal Questionnaire with its Proposal. A separate Proposal Questionnaire shall also be submitted for all proposed Subcontractors furnishing or performing Work having an estimated value in excess of 25 percent of the total proposal price, the Open Cut Excavation Subcontractor(s), the CIPP-Lining Subcontractor, and the Manhole Rehabilitation Subcontractor(s).

1. Full legal name of your organization: _____
Mailing Address: _____
Project Office Address (if different than Mailing Address): _____
Contact Person Name: _____
Contact Person Phone Number and Email Address: _____
2. This Proposal Questionnaire has been prepared by (*circle one*):
Prime Contractor Open Cut Excavation Subcontractor
Subcontractor (other) CIPP-Lining Subcontractor
Manhole Rehabilitation Subcontractor

FINANCIAL CONDITION AND PERFORMANCE HISTORY

Proposal Evaluation Raw Points Allocation: 150 (minimum) – 200 (maximum)

Proposal Evaluation Weighting Factor: 20%

3. Identify the Offeror's preferred credit rating agency and identification information. (Identify rating agency, such as Dun and Bradstreet or Equifax, and insert the organization's identification number or other method of searching your organization's credit rating with such agency.)
Credit Rating Agency: _____
Identification Number: _____
4. What is the name of your Insurance Company, along with the name, address, and phone number of the agent you expect to use in the event this contract is awarded to you?
Insurance Company Name: _____
Agent's Name: _____
Agent's Address: _____
Agent's Phone Number: _____

5. What is the name of your Surety Company, along with the name, address, and phone number of the agent you expect to use in the event this contract is awarded to you?
- Surety Company Name: _____
- Agent's Name: _____
- Agent's Address: _____
- Agent's Phone Number: _____
6. What is your total bonding capacity? _____
7. What is your available bonding capacity as of the date of this Proposal Questionnaire? _____
8. Have you ever failed to complete any work awarded to you?
- YES NO (circle one)
- If so, where and why? _____
- _____
9. Have you been assessed liquidated or delay damages by any project owner or engineer within the last 5 years? _____
- If so, where and why? _____
- _____
10. List and briefly describe any pending or past (within ten years) legal proceedings and judgments that the Offeror was a party that involved litigation of any type or had a claim in an amount over \$10,000. Also, indicate how any contingent liability may affect the financial position or ability to perform contractual commitments to the Owner. If none, so state.
- _____
- _____
- _____
11. Has the Offeror, its parent, or a subsidiary, affiliate, or other entity having common ownership or management, been the subject of any bankruptcy proceeding within the last ten years?
- YES NO (circle one)

12. In the last ten years, has the Offeror, its parent, or a subsidiary, affiliate, or other entity having common ownership or management: a) been convicted of, or indicted for, a business-related crime; b) had any business or professional license subjected to disciplinary action; or c) been penalized or fined by a state or federal environmental agency?

YES NO (*circle one*)

If so, describe the circumstances. _____

If any of the above questions are answered in a manner that indicates that any of these unfavorable factors or events are present, it is the Offeror's responsibility to: 1) describe in detail the unfavorable factor or event; and 2) provide sufficient information to demonstrate that the unfavorable factor or event will not adversely impact the Offeror's ability to perform its contractual commitments.

RELEVANT EXPERIENCE AND QUALIFICATIONS

Proposal Evaluation Raw Points Allocation: 150 (minimum) – 200 (maximum)

Proposal Evaluation Weighting Factor: 25%

13. How many years has your organization been in business as a general contractor under your present business name? _____
14. How many years experience in sanitary and/or storm sewer construction work has your organization had:
- a. As a general contractor? _____
- b. As a subcontractor? _____
15. What is the construction experience/qualifications of the key personnel from your organization who will be assigned to this project? Key personnel should include (if applicable), but not be limited to, the Project Manager, Project Engineer, Construction Field Superintendent, and Construction Field Foreman.
- a. Project Manager's Name _____
- Years with the Organization _____
- Years of Construction Experience _____
- Magnitude and Type of Work _____
- _____
- _____
- Relevant Training _____
- _____
- b. Project Engineer's Name _____
- Years with the Organization _____
- Years of Construction Experience _____
- Magnitude and Type of Work _____
- _____
- _____
- Relevant Training _____
- _____

- c. Construction Field Superintendent's Name _____
 Years with the Organization _____
 Years of Construction Experience _____
 Magnitude and Type of Work _____

 Relevant Training _____

- d. Construction Field Foreman's Name _____
 Years with the Organization _____
 Years of Construction Experience _____
 Magnitude and Type of Work _____

 Relevant Training _____

- e. Name _____
 Proposed Position/Title _____
 Years with the Organization _____
 Years of Construction Experience _____
 Magnitude and Type of Work _____

 Relevant Training _____

16. What sanitary and/or storm sewer construction projects similar in scope to the proposed Work has your organization completed for the period of five years prior to the date of the current Proposal?
Similar in scope to the proposed Work is considered to be installation and rehabilitation of sanitary and storm sewers (pipes and manholes) in established residential neighborhoods and restoration of areas in established residential neighborhoods disturbed by said sanitary and storm sewer installation and rehabilitation.
- a. Project Name and Location _____
 Contract Amount _____
 Year Completed _____

Approximate Percentage of Self-Performed Work _____

Name and Address of Owner _____

Owner Contact Name and Phone Number _____

Name and Address of Design Engineer _____

Design Engineer Contact Name and Phone Number _____

Project Delivery Method, if Other than Design-Bid-Build _____

Description of Work _____

Key Contractor Personnel (including Titles) _____

Key Subcontractors and Their Project Role(s) _____

Conditions Pertinent to Proposed Project (e.g., work in established residential neighborhoods, etc.) _____

Disputes, Delays, and Claims (provide detailed explanations of the issues involved and the resolution of each) _____

Value Engineering/Cost Savings/Schedule Savings Recommended by Offeror and Implemented on the Project _____

b. Project Name _____

Contract Amount _____

Year Completed _____

Approximate Percentage of Self-Performed Work _____

Name and Address of Owner _____

Owner Contact Name and Phone Number _____

Name and Address of Design Engineer _____

Design Engineer Contact Name and Phone Number _____

Project Delivery Method, if Other than Design-Bid-Build _____

Description of Work _____

Key Contractor Personnel (including Titles) _____

Key Subcontractors and Their Project Role(s) _____

Conditions Pertinent to Proposed Project (e.g., work in established residential neighborhoods, etc.) _____

Disputes, Delays, and Claims (provide detailed explanations of the issues involved and the resolution of each) _____

Value Engineering/Cost Savings/Schedule Savings Recommended by Offeror and Implemented on the Project _____

c. Project Name _____

Contract Amount _____

Year Completed _____

Approximate Percentage of Self-Performed Work _____

Name and Address of Owner _____

Owner Contact Name and Phone Number _____

Name and Address of Design Engineer _____

Design Engineer Contact Name and Phone Number _____

Project Delivery Method, if Other than Design-Bid-Build _____

Description of Work _____

Key Contractor Personnel (including Titles) _____

Key Subcontractors and Their Project Role(s) _____

Conditions Pertinent to Proposed Project (e.g., work in established residential neighborhoods, etc.) _____

Disputes, Delays, and Claims (provide detailed explanations of the issues involved and the resolution of each) _____

Value Engineering/Cost Savings/Schedule Savings Recommended by Offeror and Implemented on the Project _____

d. Project Name _____

Contract Amount _____

Year Completed _____

Approximate Percentage of Self-Performed Work _____

Name and Address of Owner _____

Owner Contact Name and Phone Number _____

Name and Address of Design Engineer _____

Design Engineer Contact Name and Phone Number _____

Project Delivery Method, if Other than Design-Bid-Build _____

Description of Work _____

Key Contractor Personnel (including Titles) _____

Key Subcontractors and Their Project Role(s) _____

Conditions Pertinent to Proposed Project (e.g., work in established residential neighborhoods, etc.) _____

Disputes, Delays, and Claims (provide detailed explanations of the issues involved and the resolution of each) _____

Value Engineering/Cost Savings/Schedule Savings Recommended by Offeror and Implemented on the Project _____

e. Project Name _____

Contract Amount _____

Year Completed _____

Approximate Percentage of Self-Performed Work _____

Name and Address of Owner _____

Owner Contact Name and Phone Number _____

Name and Address of Design Engineer _____

Design Engineer Contact Name and Phone Number _____

Project Delivery Method, if Other than Design-Bid-Build _____

Description of Work _____

Key Contractor Personnel (including Titles) _____

Key Subcontractors and Their Project Role(s) _____

Conditions Pertinent to Proposed Project (e.g., work in established residential neighborhoods, etc.) _____

Disputes, Delays, and Claims (provide detailed explanations of the issues involved and the resolution of each) _____

Value Engineering/Cost Savings/Schedule Savings Recommended by Offeror and Implemented on the Project _____

17. What public works projects are now in process of construction by your organization that were not listed in the previous Question?

a. Project Name _____

Contract Amount _____

Approximate Percent Complete _____

Scheduled Completion Date _____

Approximate Percentage of Self-Performed Work _____

Name and Address of Owner _____

Project Delivery Method, if Other than Design-Bid-Build _____

Description of Work _____

b. Project Name _____

Contract Amount _____

Approximate Percent Complete _____

Scheduled Completion Date _____

Approximate Percentage of Self-Performed Work _____

Name and Address of Owner _____

Project Delivery Method, if Other than Design-Bid-Build _____

Description of Work _____

- c. Project Name _____
Contract Amount _____
Approximate Percent Complete _____
Scheduled Completion Date _____
Approximate Percentage of Self-Performed Work _____
Name and Address of Owner _____

Project Delivery Method, if Other than Design-Bid-Build _____
Description of Work _____

Questions 18 through 22 only need answered by the prime Contractor.

18. Are the survey personnel performing any necessary construction staking under the direct supervision of a Professional Land Surveyor licensed in the State of Kansas?
YES NO (circle one)
19. Are the personnel preparing the traffic control plan(s) and installing the traffic control devices certified for the design and installation of construction traffic control?
YES NO (circle one)
20. Is the Contractor/subcontractor performing the surface photography/videotaping a qualified commercial company or individual experienced with photography/video equipment and photography/video recording of pre-construction surface conditions?
YES NO (circle one)
21. Is the Contractor/subcontractor performing the main sewer internal television inspection a qualified company familiar with television inspection equipment and Pipeline Assessment Certification Program (PACP) certified by the National Association of Sewer Service Companies (NASSCO)?
YES NO (circle one)
22. Have the Contractor's pipe installation personnel been instructed and trained in the proper pipe handling and installation procedures by the pipe manufacturer?
YES NO (circle one)

PROJECT APPROACH

Proposal Evaluation Raw Points Allocation: 150 (minimum) – 200 (maximum)

Proposal Evaluation Weighting Factor: 30%

Questions 23 through 30 only need answered by the prime Contractor.

23. Provide a brief narrative statement that illustrates the Offeror's understanding of the requirements of the project and the project schedule. _____

24. Provide a brief narrative statement that illustrates how the Offeror intends to manage the project (including subcontractors) to accomplish the work and meet the Unified Government's project schedule. _____

25. Describe the assumptions used to develop the Proposed Construction Progress Schedule, including float. _____

26. Provide a brief narrative description of the organization of the project team, including subcontractors. _____

27. Offeror agrees to furnish the manufacturers of materials or equipment listed below.
- a. Only one manufacturer's name shall be listed for each item. Upon award of a contract, the named manufacturer shall be furnished. Substitutions will be permitted only if the named manufacturer does not meet the requirements of the Contract Documents, the manufacturer is unable to meet the delivery requirements of the construction schedule, or the manufacturer is dilatory in complying with the requirements of the Contract Documents. Substitutions will be subject to concurrence by the Owner and shall be confirmed by Change Order.
 - b. Preliminary acceptance of equipment listed by manufacturer's name shall not in any way constitute a waiver of the specifications covering such equipment; final acceptance will be based on full conformity with the Contract Documents.

Item and Specification Section	Manufacturer
1. Precast Concrete Manholes Sections 2500 and 2600	
2. Manhole Rings and Covers Sections 2500 and 2600	
3. Precast Concrete Inlets Section 2600	
4. Sanitary Sewer Pipe (Ductile Iron) Section 2500	
5. Sanitary Sewer Pipe (PVC) Section 2500	
6. Storm Sewer Pipe (RCP) Section 2600	
7. Storm Sewer Pipe (HDPE) Section 2600	
8. Storm Sewer Pipe (Dual- and Triple- Walled Polypropylene) Section 2600	
9. CIPP Liner Section 5300	
10. Manhole Rehabilitation Cementitious Liner Section 2532	
11. Manhole Rehabilitation Flexible Epoxy or Polyurethane Coating Section 2532	

28. Offeror agrees to utilize the subcontractors listed below.

- a. Only one subcontractor's name shall be listed for each item. Upon award of a contract, the named subcontractor shall be utilized on this project. If the Offeror elects to self-perform any of the tasks listed below, they shall identify themselves on the appropriate line. Substitutions will be permitted only if the named subcontractor does not meet the requirements of the Contract Documents, the subcontractor is unable to meet the requirements of the construction schedule, the subcontractor fails to provide evidence of experience in like soil conditions, or the subcontractor is dilatory in complying with the requirements of the Contract Documents. Substitutions will be evaluated pursuant to the General Conditions.

Item	Subcontractor
1. Main Sewer and Manhole Installation / Replacement (Open Cut Excavation)	
2. Main Sewer Rehabilitation (CIPP Lining)	
3. Manhole Rehabilitation (excluding interior coatings)	
4. Manhole Rehabilitation (interior coatings) a. Cementitious Liner b. OBIC Armor 1000 Aromatic Polyurea Liner c. Monoform Interior Liners	
5. Ditch and Culvert Installation and Restoration	
6. Tree Service Company	
7. Concrete	
8. Seeding and Sodding	
9. Traffic Control	
10. Bypass Pumping	
11. Sewer Pipe Cleaning	
12. Internal CCTV Sewer Pipe Inspection	
13. Mowing and Easement Clearing	
14. Surface Photographic/Video Record	

15. Testing Laboratory	
16. Erosion and Sediment Control	
17. Other _____	
18. Other _____	

29. The Work, if awarded to you, will have the personal supervision of whom, i.e., who will be assigned as the resident superintendent?

The resident superintendent shall not be replaced without written notice to the Owner and Engineer except under extraordinary circumstances.

30. Identify the individual(s) responsible and accountable for the following Work tasks:

Overall project management: _____

Surface photography/video recording: _____

Pipe televising: _____

Point repairs: _____

CIPP-lining: _____

Non-excavation manhole rehabilitation: _____

Excavation-required manhole rehabilitation: _____

Manhole replacement: _____

31. Identify the Work components critical to the project's success and how these components would be achieved. _____

32. Identify key risk factors identified for the successful completion of this project and proposed mitigation of each. _____

33. Identify any suggested revisions to the Contract Documents and explain the rationale for such revisions and the associated benefits to the Owner. Offerors are encouraged to suggest revisions that would more efficiently allocate risk, improve the parties' understanding of risk allocation, and improve or clarify any terms of the Contract Documents where ambiguities or uncertainties may arise in their application or interpretation. _____

The Owner is not obligated to accept any of the requested exceptions, modifications, additions, etc. submitted by the Offeror when negotiating and finalizing the Agreement. Furthermore, the Owner may request additional revisions during negotiations and before finalizing the Agreement.

34. State the name and telephone number of a representative(s) of your organization who personally visited and inspected the sample project site(s) prior to submittal of this Proposal. _____

35. Describe the subsurface and physical conditions at or contiguous to the sample project site(s) that your representative(s) listed above investigated and how they were accounted for in the preparation of your organization's Price Proposal. _____

LABOR COMPLIANCE

Proposal Evaluation Raw Points Allocation: 150 (minimum) – 200 (maximum)

Proposal Evaluation Weighting Factor: 5%

36. Within the past three years, has the Offeror been found in violation of any law applicable to its contracting business, including, but not limited to, antitrust, public contracting, employment discrimination, licensing laws, tax laws, wage and hour laws, prevailing wage laws, environmental laws or others, where the result of such violation was the payment of a fine, back pay damages or any other type of penalty, or have they settled any wage claims in the amount of \$5,000 or more?
YES NO (circle one)
If so, describe the circumstances. _____
37. Will the Offeror pay all employees on the project, at a minimum, the applicable wage and fringe benefit rates for the classification in which the worker is employed in accordance with rates established by federal, state, or local wage law?
YES NO (circle one)
38. Does your organization have a written drug and alcohol substance abuse policy?
YES NO (circle one)
39. Have all employees proposed to perform Work for this contract completed a two-hour Occupational Safety and Health Administration (OSHA) drug and alcohol awareness course?
YES NO (circle one)

SAFETY RECORD

Proposal Evaluation Raw Points Allocation: 150 (minimum) – 200 (maximum)

Proposal Evaluation Weighting Factor: 20%

40. Name of Offeror's Safety Officer: _____
41. Does your organization have a written safety and health program?
YES NO (circle one)
42. Does your organization provide a ten-hour Occupational Safety and Health Administration (OSHA) construction safety program for its onsite employees which includes a course in construction safety and health approved by OSHA?
YES NO (circle one)
43. Have all employees proposed to perform Work for this contract completed a ten-hour OSHA construction safety program? (The Offeror must provide copies of employee OSHA cards to the Unified Government upon request.)
YES NO (circle one)
44. Provide as an Attachment Offeror's OSHA No. 500- Log & Summary of Occupational Injuries & Illnesses for the past five years.
45. Provide as an Attachment Offeror's list of all OSHA Citations & Notifications of Penalty (monetary or other) received within the last five years (indicate disposition as applicable) - IF NONE, SO STATE.

46. Provide the following for the Offeror for the last five years (attach additional sheets as necessary):
- a. Workers' compensation Experience Modification Rate (EMR):
- (1) Year _____ EMR _____
- (2) Year _____ EMR _____
- (3) Year _____ EMR _____
- (4) Year _____ EMR _____
- (5) Year _____ EMR _____
- b. Total Recordable Frequency Rate (TRFR):
- (1) Year _____ TRFR _____
- (2) Year _____ TRFR _____
- (3) Year _____ TRFR _____

(4) Year _____ TRFR _____

(5) Year _____ TRFR _____

47. Provide the following for the Offeror Days Away From Work, Days of Restricted Work Activity or Job Transfer (DART) incidence rate for the particular industry or type of Work to be performed for the last five years (attach additional sheets as necessary):

a. Year _____ DART _____

b. Year _____ DART _____

c. Year _____ DART _____

d. Year _____ DART _____

e. Year _____ DART _____

COOPERATIVE PROCUREMENT

Proposal Evaluation Point Allocation: None. Offeror's responses will not affect award.

These questions only need answered by the prime Contractor.

If the Unified Government awarded you the proposed contract, would you sell under the prices and terms of this Contract to any Municipality, County Public Utility, Hospital, Educational Institution, or any other non-profit organization having membership in the Mid-America Council of Public Procurement and located within the Greater Kansas City Metropolitan Trade Area?

YES NO (circle one)

If the Unified Government awarded you the proposed contract, would you sell under the prices and terms of this Contract to any community-based partnership (CBP) or public-private partnership (PPP) contracted with the Unified Government to deliver public improvement projects within Wyandotte County, Kansas?

YES NO (circle one)

- All deliveries shall be F.O.B. Destination and there shall be no obligations on the part of any member of said Council, CBP, or PPP to utilize this Contract.
- Sales will be made in accordance with the prices, terms, and conditions of the Contract Documents and any subsequent contract.
- There shall, however, be no obligation under the cooperative procurement agreement for any organization to utilize the Contract.
- All sales to other jurisdictions will be made on purchase orders issued by that jurisdiction. All receiving, inspection, payments and other contract administration will be the responsibility of the ordering jurisdiction.
- The Unified Government Purchasing Director is responsible for handling the solicitation and award of the contract. The Purchasing Director has authority to modify the contract and handle disputes regarding the substance of the contract.
- Each jurisdiction, CBP, or PPP that is a party to the joint Contract has authority to act as Administrative Contracting Officer with responsibility to issue purchase orders, inspect and receive goods, make payments and handle disputes involving shipment to the jurisdiction.

SIGNATURE

The Offeror will comply with all provisions in the RFP, and if applicable, provide notice that the Offeror qualifies as a Unified Government bidder. Proposal Questionnaires must be signed by a company officer empowered to bind the company. An Offeror's failure to include these items in their Proposals may cause their Proposal to be determined to be non-responsive and the Proposal may be rejected.

Respectfully submitted,

By _____
Signature

Date

SEAL

Title

Offeror's form of business is:

Attest _____
(Corporations only)

_____ An INDIVIDUAL,
residing in the State of _____

Business Address

_____ A PARTNERSHIP,
organized in the State of _____

License Number (if applicable)

_____ A CORPORATION,
incorporated in the State of _____

PRICE PROPOSAL

UNIFIED GOVERNMENT OF WYANDOTTE COUNTY / KANSAS CITY, KANSAS

PRICE PROPOSAL

To: The Unified Government of Wyandotte County/Kansas City, Kansas

Price Proposal of _____
(hereinafter called "Offeror") organized and existing under the laws of the State of

_____, doing business as _____

1. In compliance with the Request for Proposal, the undersigned Offeror hereby proposes to furnish all material, tools, labor and equipment and to perform all Work necessary to construct and complete the Project known as:

**Project Name: On-Call Sanitary and Storm Sewer Collection System
Repair and Replacement**
Project ID: 6301

in strict accordance with the Contract Documents, within the time set forth herein, and at the prices stated herein.

2. By submission of this Price Proposal, each Offeror certifies, and in the case of a joint Price Proposal each party thereto certifies, as to his own organization, that:
- A. The price submitted is independently arrived at without collusion.
 - B. The Offeror has not knowingly influenced and promises that it will not knowingly influence a Unified Government employee or former Unified Government employee to breach any of the ethical standards set forth in Article 12 (Ethics in Public Contracting) of the Procurement Code and in Chapter 12 of the Procurement Regulations.
 - C. The Offeror has not violated, is not violating, and promises that it will not violate the prohibition against gratuities and kickbacks set forth in Section 29-635 (Gratuities and Kickbacks) of the Procurement Regulations.
 - D. The Offeror represents that he has not retained and will not retain a person to solicit or secure a Unified Government contract upon an agreement or understanding for a commission, percentage, brokerage, or contingent fee, except for retention of bona fide employees or bona fide established commercial selling agencies for the purpose of securing business.

3. Offeror acknowledges receipt of the following Amendment(s):

4. Offeror agrees to furnish all materials, labor, tools, equipment and perform all the Work described in the Contract Documents for the following prices:

(Listed on attached table)

On-Call Sanitary and Storm Sewer Collection System Repair and Replacement

Table A: Cured-In-Place Pipe (CIPP) Liner (Gravity Sanitary and Storm)

Item Number	Pipe Diameter (inches)	Minimum Finished Liner Thickness ⁽⁴⁾ (mm)	Install Gravity Sewer CIPP Liner Unit Price ^{(1), (2), (3)}		
			Authorization ⁽⁵⁾ : ≤ 1,000 LF (\$/LF)	Authorization ⁽⁵⁾ : > 1,000 LF and ≤ 2,500 LF (\$/LF)	Authorization ⁽⁵⁾ : > 2,500 LF (\$/LF)
A-1	8	6.0			
A-2	10	6.0			
A-3	12	6.0			
A-4	15	7.5			
A-5	18	9.0			
A-6	21	9.0			
A-7	24	10.5			
A-8	30	12.0			
A-9	36	12.0			
A-10	42	15.0			
A-11	48	16.5			
A-12	54	21.0			
A-13	60	24.0			
A-14	66	30.0			
A-15	72	37.5			

⁽¹⁾ Refer to the Contract Specifications for detailed descriptions of the proposed Work, including subsidiary items.

⁽²⁾ Unit prices shall include cleaning and televising, and opening of all active service connections as specified in Section 5300.

⁽³⁾ Unit prices for pipe diameters up to and including 24-inch diameter shall include bypass pumping as specified in Section 5300. Bypass pumping for diameters greater than 24-inches shall require the Contractor to obtain bids from at least two subcontractors. Bids shall include all necessary components to provide, deliver, setup, operate, and demobilize a fully functional bypass pumping system that meets the required capacity and requirements of the Contract Specifications, including necessary pipe plugs, and appropriate Contractor markup. The lowest and best bid as deemed to be in the best interest of the Owner will be accepted.

⁽⁴⁾ Liner thicknesses will vary depending on actual field conditions and are to be based on the parameters provided in Section 5300.

⁽⁵⁾ Authorization quantity refers to the total length of CIPP liner (all pipe diameters and liner thicknesses) identified in the Authorization.

On-Call Sanitary and Storm Sewer Collection System Repair and Replacement

Table B: Cured-In-Place Pipe (CIPP) Liner Additional Thickness (Gravity Sanitary and Storm)

Item Number	Pipe Diameter (inches)	Minimum Finished Liner Thickness (mm)	Additional Cost for Every 1.5 mm of Liner Thickness Above Minimum Unit Price ^{(1), (2)}		
			Authorization ⁽³⁾ : ≤ 1,000 LF (\$/LF/1.5 mm)	Authorization ⁽³⁾ : > 1,000 LF and ≤ 2,500 LF (\$/LF/1.5 mm)	Authorization ⁽³⁾ : > 2,500 LF (\$/LF/1.5 mm)
B-1	8	6.0			
B-2	10	6.0			
B-3	12	6.0			
B-4	15	7.5			
B-5	18	9.0			
B-6	21	9.0			
B-7	24	10.5			
B-8	30	12.0			
B-9	36	12.0			
B-10	42	15.0			
B-11	48	16.5			
B-12	54	21.0			
B-13	60	24.0			
B-14	66	30.0			
B-15	72	37.5			

⁽¹⁾Refer to the Contract Specifications for detailed descriptions of the proposed Work, including subsidiary items.

⁽²⁾If wall thickness calculations for a pipe indicate that additional (above standard design) CIPP wall thickness is required, Contractor shall provide calculations and recommendation for the wall thickness required. Engineer will review and provide response as to final CIPP thickness to be installed. Contractor shall be paid for each 1.5mm of additional CIPP wall thickness provided and installed in accordance with the price provided in Table B.

⁽³⁾Authorization quantity refers to the total length of CIPP liner (all pipe diameters and liner thicknesses) identified in the Authorization.

On-Call Sanitary and Storm Sewer Collection System Repair and Replacement

Table C: Excavation Required Pipe Rehabilitation (Point Repairs: Gravity Sanitary and Storm)

Item Number	Description ⁽¹⁾	Install PVC/HDPE Pipe Unit Price					
		Repair Length ⁽²⁾ : ≤ 10 LF (\$/LF)		Repair Length ⁽²⁾ : > 10 LF and ≤ 20 LF (\$/LF)		Repair Length ⁽²⁾ : > 20 LF and ≤ 40 LF (\$/LF)	
		Paved	Unpaved	Paved	Unpaved	Paved	Unpaved
C-1	Install PVC Pipe (8- to 12-Inch Dia., 0 to 10 Feet Depth)						
C-2	Install PVC Pipe (15- to 21-Inch Dia., 0 to 10 Feet Depth)						
C-3	Install PVC Pipe (24- to 36-Inch Dia., 0 to 10 Feet Depth)						
C-4	Install PVC Pipe (8- to 12-Inch Dia., 10.1 to 20 Feet Depth)						
C-5	Install PVC Pipe (15- to 21-Inch Dia., 10.1 to 20 Feet Depth)						
C-6	Install PVC Pipe (24- to 36-Inch Dia., 10.1 to 20 Feet Depth)						
C-7	Install HDPE Pipe (8- to 12-Inch Dia., 0 to 10 Feet Depth)						
C-8	Install HDPE Pipe (15- to 21-Inch Dia., 0 to 10 Feet Depth)						
C-9	Install HDPE Pipe (24- to 36-Inch Dia., 0 to 10 Feet Depth)						
C-10	Install HDPE Pipe (8- to 12-Inch Dia., 10.1 to 20 Feet Depth)						
C-11	Install HDPE Pipe (15- to 21-Inch Dia., 10.1 to 20 Feet Depth)						
C-12	Install HDPE Pipe (24- to 36-Inch Dia., 10.1 to 20 Feet Depth)						

⁽¹⁾Refer to the Contract Specifications for detailed descriptions of the proposed Work, including subsidiary items.

⁽²⁾Repair Length refers to the length of each individual point repair identified in the Authorization.

On-Call Sanitary and Storm Sewer Collection System Repair and Replacement

Table D: Excavation Required Pipe Replacement (Total Pipe Replacement: Gravity Sanitary and Storm)

Item Number	Description ⁽¹⁾	Install PVC/HDPE/RCP/Polypropylene Pipe Unit Price					
		Replacement Length ⁽²⁾ : > 40 LF and ≤ 100 LF (\$/LF)		Replacement Length ⁽²⁾ : > 100 LF and ≤ 300 LF (\$/LF)		Replacement Length ⁽²⁾ : > 300 LF and ≤ 600 LF (\$/LF)	
		Paved	Unpaved	Paved	Unpaved	Paved	Unpaved
D-1	Install PVC Pipe (8- to 12-Inch Dia., 0 to 10 Feet Depth)						
D-2	Install PVC Pipe (15- to 21-Inch Dia., 0 to 10 Feet Depth)						
D-3	Install PVC Pipe (24- to 36-Inch Dia., 0 to 10 Feet Depth)						
D-4	Install PVC Pipe (8- to 12-Inch Dia., 10.1 to 20 Feet Depth)						
D-5	Install PVC Pipe (15- to 21-Inch Dia., 10.1 to 20 Feet Depth)						
D-6	Install PVC Pipe (24- to 36-Inch Dia., 10.1 to 20 Feet Depth)						
D-7	Install HDPE Pipe (8- to 12-Inch Dia., 0 to 10 Feet Depth)						
D-8	Install HDPE Pipe (15- to 21-Inch Dia., 0 to 10 Feet Depth)						
D-9	Install HDPE Pipe (24- to 36-Inch Dia., 0 to 10 Feet Depth)						
D-10	Install HDPE Pipe (8- to 12-Inch Dia., 10.1 to 20 Feet Depth)						
D-11	Install HDPE Pipe (15- to 21-Inch Dia., 10.1 to 20 Feet Depth)						
D-12	Install HDPE Pipe (24- to 36-Inch Dia., 10.1 to 20 Feet Depth)						
D-13	Install RCP (8- to 12-Inch Dia., 0 to 10 Feet Depth)						
D-14	Install RCP (15- to 21-Inch Dia., 0 to 10 Feet Depth)						
D-15	Install RCP (24- to 36-Inch Dia., 0 to 10 Feet Depth)						
D-16	Install RCP (8- to 12-Inch Dia., 10.1 to 20 Feet Depth)						
D-17	Install RCP (15- to 21-Inch Dia., 10.1 to 20 Feet Depth)						
D-18	Install RCP (24- to 36-Inch Dia., 10.1 to 20 Feet Depth)						

On-Call Sanitary and Storm Sewer Collection System Repair and Replacement

Item Number	Description ⁽¹⁾	Install PVC/HDPE/RCP/Polypropylene Pipe Unit Price					
		Replacement Length ⁽²⁾ : > 40 LF and ≤ 100 LF (\$/LF)		Replacement Length ⁽²⁾ : > 100 LF and ≤ 300 LF (\$/LF)		Replacement Length ⁽²⁾ : > 300 LF and ≤ 600 LF (\$/LF)	
		Paved	Unpaved	Paved	Unpaved	Paved	Unpaved
D-19	Install Dual-Walled Polypropylene Pipe (8- to 12-Inch Dia., 0 to 10 Feet Depth)						
D-20	Install Dual-Walled Polypropylene Pipe (15- to 21-Inch Dia., 0 to 10 Feet Depth)						
D-21	Install Dual-Walled Polypropylene Pipe (24- to 30-Inch Dia., 0 to 10 Feet Depth)						
D-22	Install Dual-Walled Polypropylene Pipe (8- to 12-Inch Dia., 10.1 to 20 Feet Depth)						
D-23	Install Dual-Walled Polypropylene Pipe (15- to 21-Inch Dia., 10.1 to 20 Feet Depth)						
D-24	Install Dual-Walled Polypropylene Pipe (24- to 30-Inch Dia., 10.1 to 20 Feet Depth)						
D-25	Install Triple-Walled Polypropylene Pipe (36- to 42-Inch Dia., 0 to 10 Feet Depth)						
D-26	Install Triple-Walled Polypropylene Pipe (36- to 42-Inch Dia., 10.1 to 20 Feet Depth)						

⁽¹⁾Refer to the Contract Specifications for detailed descriptions of the proposed Work, including subsidiary items.

⁽²⁾Replacement Length refers to the length of each individual replacement pipe segment identified in the Authorization.

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Table E: Sewer Pipe Cleaning

Item Number	Pipe Diameter (inches)	Perform Sewer Pipe Light Cleaning Unit Price ^{(1), (2), (3), (4)}			Perform Sewer Pipe Heavy Cleaning Unit Price ^{(1), (2), (3), (5)}		
		Authorization ⁽⁶⁾ : ≤ 2,500 LF (\$/LF)	Authorization ⁽⁶⁾ : > 2,500 LF and ≤5,000 LF (\$/LF)	Authorization ⁽⁶⁾ : > 5,000 LF (\$/LF)	Authorization ⁽⁶⁾ : ≤ 2,500 LF (\$/LF)	Authorization ⁽⁶⁾ : > 2,500 LF and ≤5,000 LF (\$/LF)	Authorization ⁽⁶⁾ : > 5,000 LF (\$/LF)
E-1	6 - 10						
E-2	12 - 15						
E-3	18 - 21						
E-4	24						
E-5	30						
E-6	36						
E-7	42						
E-8	48						
E-9	>48						

⁽¹⁾Refer to the Contract Specifications for detailed descriptions of the proposed Work, including subsidiary items.

⁽²⁾Unit prices for sewer pipe cleaning up to and including 24-inch diameter shall include bypass pumping or flow control as needed. Bypass pumping for diameters greater than 24-inches shall require the Contractor to obtain bids from at least two subcontractors. Bids shall include all necessary components to provide, deliver, setup, operate, and demobilize a fully functional bypass pumping system that meets the required capacity and requirements of the Contract Specifications, including necessary pipe plugs, and appropriate Contractor markup. The lowest and best bid as deemed to be in the best interest of the Owner will be accepted.

⁽³⁾Sewer pipe cleaning associated with CIPP lining is subsidiary to the unit prices in Table A.

⁽⁴⁾Light cleaning is defined as three or fewer passes through the pipe with cleaning nozzles. Unit costs for light cleaning should not include televising.

⁽⁵⁾Heavy cleaning is defined as methods greater than the definition of light cleaning.

⁽⁶⁾Authorization quantity refers to the total length of pipe to be cleaned (all pipe diameters) identified in the Authorization.

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Table F: Sewer Pipe Televising

Item Number	Pipe Diameter (inches)	Perform Sewer Pipe Televising Unit Price ^{(1), (2), (3), (4)}		
		Authorization ⁽⁵⁾ : ≤ 2,500 LF (\$/LF)	Authorization ⁽⁵⁾ : > 2,500 LF and ≤5,000 LF (\$/LF)	Authorization ⁽⁵⁾ : > 5,000 LF (\$/LF)
F-1	6 - 10			
F-2	12 - 15			
F-3	18 - 21			
F-4	24			
F-5	30			
F-6	36			
F-7	42			
F-8	48			
F-9	>48			

⁽¹⁾ Refer to the Contract Specifications for detailed descriptions of the proposed Work, including subsidiary

⁽²⁾ Unit prices for sewer pipe televising up to and including 24-inch diameter shall include bypass pumping. Bypass pumping for diameters greater than 24-inches shall require the Contractor to obtain bids from at least two subcontractors. Bids shall include all necessary components to provide, deliver, setup, operate, and demobilize a fully functional bypass pumping system that meets the required capacity and requirements of the Contract Specifications, including necessary pipe plugs, and appropriate Contractor markup. The lowest and best bid as deemed to be in the best interest of the Owner will be accepted.

⁽³⁾ Sewer pipe televising associated with CIPP lining is subsidiary to the unit prices in Table A.

⁽⁴⁾ Sewer pipe televising associated with heavy cleaning is subsidiary to the unit prices in Table E.

⁽⁵⁾ Authorization quantity refers to the total length of pipe to be televised (all pipe diameters; light cleaning and heavy cleaning) identified in the Authorization.

On-Call Sanitary and Storm Sewer Collection System Repair and Replacement

Table G: Non-Excavation Required Manhole Rehabilitation

Item Number	Description ⁽¹⁾	Units	Rehabilitate Manhole Unit Price		
			Authorization ⁽²⁾ : 1 to 10 Manholes (\$/Each)	Authorization ⁽²⁾ : 11 to 25 Manholes (\$/Each)	Authorization ⁽²⁾ : ≥ 26 Manholes (\$/Each)
G-1	Replace Manhole Frame Gasket	Each			
G-2a	Replace Existing Cover with UG Standard Cover	Each			
G-2b	Replace Existing Cover with UG Standard Bolt Down Cover	Each			
G-3	Install Flexible Liner	Each Manhole			
G-4	Repair Cracks and Joints	Each Manhole			
G-5	Repair and Grout Pipe Seals	Each Manhole			
G-6a	Repair Bench and Trough (48-Inch Dia.)	Each Manhole			
G-6b	Repair Bench and Trough (60-Inch Dia.)	Each Manhole			
G-6c	Repair Bench and Trough (72-Inch Dia.)	Each Manhole			

⁽¹⁾Refer to the Contract Specifications for detailed descriptions of the proposed Work, including subsidiary items.

⁽²⁾Authorization quantity refers to the total quantity of manholes to be rehabilitated and replaced (all manholes in Tables G, H, I) identified in the Authorization.

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Table H: Manhole Lining

Item Number	Description ⁽¹⁾	Units	Rehabilitation Manhole Unit Price		
			Authorization ⁽²⁾ : 0.1 to 50.0 VF (\$/VF)	Authorization ⁽²⁾ : 50.1 to 200.0 VF (\$/VF)	Authorization ⁽²⁾ : ≥ 200.1 VF (\$/VF)
H-1a	Install Cementitious Liner (48-Inch Dia.)	Vertical Feet			
H-1b	Install Cementitious Liner (60-Inch Dia.)	Vertical Feet			
H-1c	Install Cementitious Liner (72-Inch Dia.)	Vertical Feet			
H-2a	Install Epoxy Liner (48-Inch Dia.)	Vertical Feet			
H-2b	Install Epoxy Liner (60-Inch Dia.)	Vertical Feet			
H-2c	Install Epoxy Liner (72-Inch Dia.)	Vertical Feet			
H-3a	Install Epoxy Liner In New Manhole (48-Inch Dia.)	Vertical Feet			
H-3b	Install Epoxy Liner In New Manhole (60-Inch Dia.)	Vertical Feet			
H-3c	Install Epoxy Liner In New Manhole (72-Inch Dia.)	Vertical Feet			
H-4a	Install Cementitious and Epoxy Liner (48-Inch Dia.)	Vertical Feet			
H-4b	Install Cementitious and Epoxy Liner (60-Inch Dia.)	Vertical Feet			
H-4c	Install Cementitious and Epoxy Liner (72-Inch Dia.)	Vertical Feet			
H-5a	Install OBIC Armor 1000 Aromatic Polyurea Liner (48-Inch Dia.)	Vertical Feet			
H-5b	Install OBIC Armor 1000 Aromatic Polyurea Liner (60-Inch Dia.)	Vertical Feet			
H-5c	Install OBIC Armor 1000 Aromatic Polyurea Liner (72-Inch Dia.)	Vertical Feet			

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Item Number	Description ⁽¹⁾	Units	Rehabilitation Manhole Unit Price		
			Authorization ⁽²⁾ : 0.1 to 50.0 VF (\$/VF)	Authorization ⁽²⁾ : 50.1 to 200.0 VF (\$/VF)	Authorization ⁽²⁾ : ≥ 200.1 VF (\$/VF)
H-6a	Install Monoform ABS Plastic Interior Liner (48-Inch Dia.)	Vertical Feet			
H-6b	Install Monoform ABS Plastic Interior Liner (60-Inch Dia.)	Vertical Feet			
H-6c	Install Monoform ABS Plastic Interior Liner (72-Inch Dia.)	Vertical Feet			
H-7a	Install Monoform PLUS HDPE Interior Liner (48-Inch Dia.)	Vertical Feet			
H-7b	Install Monoform PLUS HDPE Interior Liner (60-Inch Dia.)	Vertical Feet			
H-7c	Install Monoform PLUS HDPE Interior Liner (72-Inch Dia.)	Vertical Feet			

⁽¹⁾Refer to the Contract Specifications for detailed descriptions of the proposed Work, including subsidiary items.

⁽²⁾Authorization quantity refers to the total depth of manholes to be lined (all liner types and manhole diameters) identified in the Authorization.

On-Call Sanitary and Storm Sewer Collection System Repair and Replacement

Table I: Excavation Required Manhole Rehabilitation

Item Number	Description ⁽¹⁾	Units	Rehabilitate Manhole Unit Price					
			Authorization ⁽²⁾ : 1 to 10 Manholes (\$/Each)		Authorization ⁽²⁾ : 11 to 25 Manholes (\$/Each)		Authorization ⁽²⁾ : ≥ 26 Manholes (\$/Each)	
			Paved	Unpaved	Paved	Unpaved	Paved	Unpaved
I-1a	Replace Existing Frame and Cover with UG Standard Frame and Cover	Each Manhole						
I-1b	Replace Existing Frame and Cover with UG Standard Bolt Down Frame and Cover	Each Manhole						
I-1c	Replace Existing Frame and Cover with Polymer Frame and Cover	Each Manhole						
I-2	Replace Grade Adjustment	Each Manhole						
I-3	Add Grade Adjustment	Each Manhole						
Item Number	Description ⁽¹⁾	Units	Rehabilitate Manhole Unit Price					
			Authorization ⁽²⁾ : 1 Manhole (\$/Each)		Authorization ⁽²⁾ : 2 to 5 Manholes (\$/Each)		Authorization ⁽²⁾ : 6 to 15 Manholes (\$/Each)	
			Paved	Unpaved	Paved	Unpaved	Paved	Unpaved
I-4a	Install Flattop on Existing Manhole (48-Inch Dia.)	Each						
I-4b	Install Flattop on Existing Manhole (60-Inch Dia.)	Each						
I-4c	Install Flattop on Existing Manhole (72-Inch Dia.)	Each						
Item Number	Description ⁽¹⁾	Units	Rehabilitate Manhole Unit Price					
			Authorization ⁽²⁾ : 1 Manhole (\$/VF)		Authorization ⁽²⁾ : 2 to 5 Manholes (\$/VF)		Authorization ⁽²⁾ : 6 to 15 Manholes (\$/VF)	
			Paved	Unpaved	Paved	Unpaved	Paved	Unpaved
I-5a	Replace Existing Manhole Cone and Above (48-Inch Dia.)	Vertical Feet						
I-5b	Replace Existing Manhole Cone and Above (60-Inch Dia.)	Vertical Feet						
I-5c	Replace Existing Manhole Cone and Above (72-Inch Dia.)	Vertical Feet						
Item Number	Description ⁽¹⁾	Units	Rehabilitate Manhole Unit Price					
			Authorization ⁽²⁾ : 1 Manhole (\$/VF)		Authorization ⁽²⁾ : 2 to 5 Manholes (\$/VF)		Authorization ⁽²⁾ : 6 to 15 Manholes (\$/VF)	
			Paved	Unpaved	Paved	Unpaved	Paved	Unpaved
I-6a	Replace Existing Manhole Barrel, Cone and Above (48-Inch Dia.)	Vertical Feet						
I-6b	Replace Existing Manhole Barrel, Cone and Above (60-Inch Dia.)	Vertical Feet						
I-6c	Replace Existing Manhole Barrel, Cone and Above (72-Inch Dia.)	Vertical Feet						
Item Number	Description ⁽¹⁾	Units	Rehabilitate Manhole Unit Price					
			Authorization ⁽²⁾ : 1 Manhole (\$/Each)		Authorization ⁽²⁾ : 2 to 5 Manholes (\$/Each)		Authorization ⁽²⁾ : 6 to 15 Manholes (\$/Each)	
			Paved	Unpaved	Paved	Unpaved	Paved	Unpaved
I-7a	Replace Existing Manhole with Precast Concrete Manhole (48-Inch Dia., 0 to 8 Feet Depth)	Each						
I-7b	Replace Existing Manhole with Precast Concrete Manhole (60-Inch Dia., 0 to 8 Feet Depth)	Each						
I-7c	Replace Existing Manhole with Precast Concrete Manhole (72-Inch Dia., 0 to 8 Feet Depth)	Each						

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Item Number	Description ⁽¹⁾	Units	Rehabilitate Manhole Unit Price					
			Authorization ⁽²⁾ : 1 Manhole (\$/Each)		Authorization ⁽²⁾ : 2 to 5 Manholes (\$/Each)		Authorization ⁽²⁾ : 6 to 15 Manholes (\$/Each)	
			Paved	Unpaved	Paved	Unpaved	Paved	Unpaved
I-8a	Replace Existing Manhole with Polymer Concrete Manhole (48-Inch Dia., 0 to 8 Feet Depth)	Each						
I-8b	Replace Existing Manhole with Polymer Concrete Manhole (60-Inch Dia., 0 to 8 Feet Depth)	Each						
I-8c	Replace Existing Manhole with Polymer Concrete Manhole (72-Inch Dia., 0 to 8 Feet Depth)	Each						
Item Number	Description ⁽¹⁾	Units	Rehabilitate Manhole Unit Price					
			Authorization ⁽³⁾ : 0.1 to 10.0 VF (\$/VF)		Authorization ⁽³⁾ : 10.1 to 20.0 VF (\$/VF)		Authorization ⁽³⁾ : ≥ 20.1 VF (\$/VF)	
			Paved	Unpaved	Paved	Unpaved	Paved	Unpaved
I-9a	Install Precast Concrete Manhole Extra Depth (48-Inch Dia.)	Vertical Feet						
I-9b	Install Precast Concrete Manhole Extra Depth (60-Inch Dia.)	Vertical Feet						
I-9c	Install Precast Concrete Manhole Extra Depth (72-Inch Dia.)	Vertical Feet						
Item Number	Description ⁽¹⁾	Units	Rehabilitate Manhole Unit Price					
			Authorization ⁽³⁾ : 0.1 to 10.0 VF (\$/VF)		Authorization ⁽³⁾ : 10.1 to 20.0 VF (\$/VF)		Authorization ⁽³⁾ : ≥ 20.1 VF (\$/VF)	
			Paved	Unpaved	Paved	Unpaved	Paved	Unpaved
I-10a	Install Polymer Concrete Manhole Extra Depth (48-Inch Dia.)	Vertical Feet						
I-10b	Install Polymer Concrete Manhole Extra Depth (60-Inch Dia.)	Vertical Feet						
I-10c	Install Polymer Concrete Manhole Extra Depth (72-Inch Dia.)	Vertical Feet						
Item Number	Description ⁽¹⁾	Units	Rehabilitate Manhole Unit Price					
			Authorization ⁽⁴⁾ : 1 Inlet (\$/Each)		Authorization ⁽⁴⁾ : 2 to 5 Inlets (\$/Each)		Authorization ⁽⁴⁾ : 6 to 15 Inlets (\$/Each)	
			Paved		Paved		Paved	
I-11	Replace Existing Inlet with Precast Concrete Inlet (5' x 3', 0 to 8 Feet Depth)	Each						

⁽¹⁾Refer to the Contract Specifications for detailed descriptions of the proposed Work, including subsidiary items.

⁽²⁾Authorization quantity refers to the total quantity of manholes to be rehabilitated and replaced (all manholes in Tables G, H, I) identified in the Authorization.

⁽³⁾Authorization quantity refers to the total extra depth of manholes (all manhole diameters) identified in the Authorization.

⁽⁴⁾Authorization quantity refers to the total quantity of inlets to be replaced identified in the Authorization.

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Table J: Miscellaneous Construction

Item Number	Description ^{(1), (2)}	Units	Installation Unit Price		
			Authorization ⁽³⁾ : 1 Manhole	Authorization ⁽³⁾ : 2 to 5 Manholes	Authorization ⁽³⁾ : 6 to 15 Manholes
J-1a	Install Inside Drop Bowl, Fittings, and Piping (8-Inch Dia. Drop)	Each			
J-1b	Install Inside Drop Bowl, Fittings, and Piping (10-Inch Dia. Drop)	Each			
Item Number	Description ^{(1), (4)}	Units	Repair Unit Price		
			Authorization ⁽⁵⁾ : 1 Location	Authorization ⁽⁵⁾ : 2 to 5 Locations	Authorization ⁽⁵⁾ : 6 to 15 Locations
J-2	Repair Cave-In	Each			
Item Number	Description ⁽¹⁾	Units	Provide Site Access Unit Price		
			Authorization ⁽⁶⁾ : ≤ 500 LF (\$/LF)	Authorization ⁽⁶⁾ : > 500 LF and ≤ 2,500 LF (\$/LF)	Authorization ⁽⁶⁾ : > 2,500 LF (\$/LF)
J-3a	Mow Easement for Site Access (10-Foot Wide Corridor)	LF			
J-3b	Mow Easement for Site Access (20-Foot Wide Corridor)	LF			
J-3c	Mow Easement for Site Access (30-Foot Wide Corridor)	LF			
J-4a	Clear Easement for Site Access (10-Foot Wide Corridor)	LF			
J-4b	Clear Easement for Site Access (20-Foot Wide Corridor)	LF			
J-4c	Clear Easement for Site Access (30-Foot Wide Corridor)	LF			
Item Number	Description ⁽¹⁾	Units	Remove Trees for Site Access Unit Price		
			Authorization ⁽⁷⁾ : ≤ 5 trees (\$/tree)	Authorization ⁽⁷⁾ : > 5 and ≤ 20 trees (\$/tree)	Authorization ⁽⁷⁾ : > 20 trees (\$/tree)
J-5a	Remove Trees for Site Access (6- to 12-Inch Dia.)	Each			
J-5b	Remove Trees for Site Access (13- to 19-Inch Dia.)	Each			
J-5c	Remove Trees for Site Access (20- to 25-Inch Dia.)	Each			
J-5d	Remove Trees for Site Access (> 25-Inch Dia.)	Each			

⁽¹⁾Refer to the Contract Specifications for detailed descriptions of the proposed Work, including subsidiary items.

⁽²⁾Inside drops that require more than 13 vertical feet will be considered changed conditions. Contractor shall provide price proposal for the additional work and materials required for review by Engineer.

⁽³⁾Authorization quantity refers to the total quantity of inside drop bowls to be installed (all diameters) identified in the Authorization.

⁽⁴⁾Cave-in repair sites that require additional work and restoration beyond 100 square feet shall be considered a changed condition. Contractor shall provide price proposal for the additional work and materials required for review by Engineer.

⁽⁵⁾Authorization quantity refers to the total quantity of cave-ins to be repaired identified in the Authorization.

⁽⁶⁾Authorization quantity refers to the total length of site access to be provided (mowing and clearing; all widths) identified in the Authorization.

⁽⁷⁾Authorization quantity refers to the total quantity of trees to be removed (all diameters) identified in the Authorization.

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Table K: Hourly Work - Labor

Item Number	Personnel ⁽¹⁾	Labor Unit Price ⁽²⁾			
		Standard Rate (\$/hour)	Overtime Rate (\$/hour)	Weekend Rate (\$/hour)	Holiday Rate (\$/hour)
K-1	Project Manager				
K-2	Supervisor				
K-3	Foreman				
K-4	Equipment Operator				
K-5	Laborer				
K-6	Shop Foreman				
K-7	Other:				
K-8	Other:				
K-9	Other:				

⁽¹⁾Hourly Work – Labor refers to authorized sanitary or storm sewer collection system Work that is not paid for by a separate bid item in this Price Proposal.

⁽²⁾Contractor shall have a 24-hour emergency response time for which this pricing shall be good for such occasions. Twenty-four hour emergency response is defined as responding to the situation identified by the Owner and correcting the immediate danger to the public or the environment. Work may include construction work or set-up of bypass pumping to eliminate discharge from the sewer system. Work that is not an immediate danger to the public or environment can be completed beyond the 24-hour timeframe.

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Table L: Hourly Work - Equipment

Item Number	Equipment ⁽¹⁾	Equipment Unit Price ⁽²⁾	
		Standard Rate (\$/hour)	Mobilization Charge (\$)
L-1	Small Excavator (<20,000 lb)		
L-2	Medium Excavator (20,000 lb to 45,000 lb)		
L-3	Large Excavator (> 45,000 lb)		
L-4	Dump Truck (tandem axle)		
L-5	Skid Steer		
L-6	Track/Wheel Loader		
L-7	Hydro Excavator (up to 1,200 gallons)		
L-8	Large Hydro Excavator (> 1,200 gallons)		

⁽¹⁾Hourly Work – Equipment refers to authorized sanitary or storm sewer collection system Work that is not paid for by a separate bid item in this Price Proposal.

⁽²⁾Contractor shall have a 24-hour emergency response time for which this pricing shall be good for such occasions. Twenty-four hour emergency response is defined as responding to the situation identified by the Owner and correcting the immediate danger to the public or the environment. Work may include construction work or set-up of bypass pumping to eliminate discharge from the sewer system. Work that is not an immediate danger to the public or environment can be completed beyond the 24-hour timeframe.

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Table M: Ditch Installation

Item Number	Description ⁽¹⁾	Install Ditch Unit Price					
		Install Length ⁽²⁾ : ≤ 250 LF (\$/LF)		Install Length ⁽²⁾ : > 250 LF and ≤ 1,000 LF (\$/LF)		Install Length ⁽²⁾ : > 1,000 LF (\$/LF)	
		Steep ⁽³⁾	Shallow ⁽³⁾	Steep ⁽³⁾	Shallow ⁽³⁾	Steep ⁽³⁾	Shallow ⁽³⁾
M-1	Install Standard V-Shaped Ditch (3H:1V Slope or Flatter; 0 to 2 Feet Depth)						
M-2	Install Standard V-Shaped Ditch (3H:1V Slope or Flatter; 2 to 4 Feet Depth)						
M-3	Install Standard V-Shaped Ditch (3H:1V Slope or Flatter; 4 to 8 Feet Depth)						
M-4	Install Flat Bottom Ditch (3H:1V Slope or Flatter; 0 to 2 Feet Depth)						
M-5	Install Flat Bottom Ditch (3H:1V Slope or Flatter; 2 to 4 Feet Depth)						
M-6	Install Flat Bottom Ditch (3H:1V Slope or Flatter; 4 to 8 Feet Depth)						

⁽¹⁾Refer to the Contract Specifications for detailed descriptions of the proposed Work, including subsidiary items.

⁽²⁾Install Length refers to the length of each individual ditch identified in the Authorization.

⁽³⁾Steep = Deeper than 4 feet from edge of road or ROW (whichever is lower). Shallow = Less than 4 feet from edge or road or ROW (whichever is lower).

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Table N: Ditch Resetoration

Item Number	Description ⁽¹⁾	Units	Install Drain Basin Unit Price		
			Authorization ⁽²⁾ : 1 Drain Basin	Authorization ⁽²⁾ : 2 to 10 Drain Basins	Authorization ⁽²⁾ : 11 to 24 Drain Basins
N-1a	Install Nyloplast Drain Basin (30-Inch Dia., 6' Depth)	Each			
N-1b	Install Nyloplast Drain Basin (30-Inch Dia., 8' Depth)	Each			
N-1c	Install Nyloplast Drain Basin (30-Inch Dia., 10' Depth)	Each			
Item Number	Description ^{(1), (4)}	Units	Restore Existing Ditch Unit Price		
			Authorization ⁽³⁾ : ≤ 1,000 LF (\$/LF)	Authorization ⁽³⁾ : > 1,000 LF and ≤ 3,500 LF (\$/LF)	Authorization ⁽³⁾ : > 3,500 LF (\$/LF)
N-2a	Restore Existing V-Shaped Ditch Cross-Section (0 to 2 Feet Depth)	LF			
N-2b	Restore Existing V-Shaped Ditch Cross-Section (2 to 4 Feet Depth)	LF			
N-2c	Restore Existing V-Shaped Ditch Cross-Section (4 to 8 Feet Depth)	LF			
N-3a	Restore Existing Flat Bottom Ditch Cross-Section (0 to 2 Feet Depth)	LF			
N-3b	Restore Existing Flat Bottom Ditch Cross-Section (2 to 4 Feet Depth)	LF			
N-3c	Restore Existing Flat Bottom Ditch Cross-Section (4 to 8 Feet Depth)	LF			
Item Number	Description ⁽¹⁾	Units	Remove Trees for Site Access Unit Price		
			Authorization ⁽⁵⁾ : ≤ 20 SY (\$/SY)	Authorization ⁽⁵⁾ : > 20 and ≤ 100 SY (\$/SY)	Authorization ⁽⁵⁾ : > 100 SY (\$/SY)
N-4a	Perform Additional Asphalt Restoration	SY			
N-4b	Perform Additional Concrete Restoration	SY			

⁽¹⁾Refer to the Contract Specifications for detailed descriptions of the proposed Work, including subsidiary items.

⁽²⁾Authorization quantity refers to the total quantity of Nyloplast drain basins to be installed (all depths) identified in the Authorization.

⁽³⁾Authorization quantity refers to the total length of ditch to be restored (all widths and depths) identified in the Authorization.

⁽⁴⁾Depth of ditch defined by edge of road or ROW (whichever is lower).

⁽⁵⁾Authorization quantity refers to the total quantity of additional restoration (asphalt and concrete) identified in the Authorization.

On-Call Sanitary and Storm Sewer Collection System Repair and Replacement

Table O: Culvert Installation

Item Number	Description ⁽¹⁾	Install HDPE/Aluminized CMP Culvert Unit Price					
		Install Length ⁽²⁾ : ≤ 100 LF (\$/LF)		Install Length ⁽²⁾ : > 100 LF and ≤ 200 LF (\$/LF)		Install Length ⁽²⁾ : > 200 LF and ≤ 400 LF (\$/LF)	
		Paved	Unpaved	Paved	Unpaved	Paved	Unpaved
O-1	Install HDPE Culvert (8- to 12-Inch Dia., 0 to 10 Feet Depth)						
O-2	Install HDPE Culvert (15- to 21-Inch Dia., 0 to 10 Feet Depth)						
O-3	Install HDPE Culvert (24- to 36-Inch Dia., 0 to 10 Feet Depth)						
O-4	Install HDPE Culvert (8- to 12-Inch Dia., 10.1 to 20 Feet Depth)						
O-5	Install HDPE Culvert (15- to 21-Inch Dia., 10.1 to 20 Feet Depth)						
O-6	Install HDPE Culvert (24- to 36-Inch Dia., 10.1 to 20 Feet Depth)						
O-7	Install Aluminized CMP Culvert (8- to 12-Inch Dia., 0 to 10 Feet Depth)						
O-8	Install Aluminized CMP Culvert (15- to 21-Inch Dia., 0 to 10 Feet Depth)						
O-9	Install Aluminized CMP Culvert (24- to 36-Inch Dia., 0 to 10 Feet Depth)						
O-10	Install Aluminized CMP Culvert (8- to 12-Inch Dia., 10.1 to 20 Feet Depth)						
O-11	Install Aluminized CMP Culvert (15- to 21-Inch Dia., 10.1 to 20 Feet Depth)						
O-12	Install Aluminized CMP Culvert (24- to 36-Inch Dia., 10.1 to 20 Feet Depth)						

⁽¹⁾Refer to the Contract Specifications for detailed descriptions of the proposed Work, including subsidiary items.

⁽²⁾Install Length refers to the length of each individual culvert identified in the Authorization.

On-Call Sanitary and Storm Sewer Collection System Repair and Replacement

Table P: Culvert Cleaning

Item Number	Culvert Diameter (inches)	Perform Culvert Light Cleaning Unit Price ^{(1), (2)}			Perform Culvert Heavy Cleaning Unit Price ^{(1), (3)}		
		Authorization ⁽⁴⁾ : ≤ 250 LF (\$/LF)	Authorization ⁽⁴⁾ : > 250 LF and ≤500 LF (\$/LF)	Authorization ⁽⁴⁾ : > 500 LF (\$/LF)	Authorization ⁽⁴⁾ : ≤ 250 LF (\$/LF)	Authorization ⁽⁴⁾ : > 250 LF and ≤500 LF (\$/LF)	Authorization ⁽⁴⁾ : > 500 LF (\$/LF)
P-1	6 - 10						
P-2	12 - 15						
P-3	18 - 21						
P-4	24						
P-5	30						
P-6	36						
P-7	42						
P-8	48						
P-9	>48						

⁽¹⁾Refer to the Contract Specifications for detailed descriptions of the proposed Work, including subsidiary items.

⁽²⁾Light cleaning is defined as three or fewer passes through the pipe with cleaning nozzles. Unit costs for light cleaning should include televising.

⁽³⁾Heavy cleaning is defined as methods greater than the definition of light cleaning.

⁽⁴⁾Authorization quantity refers to the total length of culvert to be cleaned (all culvert diameters) identified in the Authorization.

Respectfully submitted,

By _____
Signature

Date

SEAL

Title

Offeror's form of business is:

Attest _____
(Corporations only)

_____ An INDIVIDUAL,
residing in the State of _____

Business Address

_____ A PARTNERSHIP,
organized in the State of _____

License Number (if applicable)

_____ A CORPORATION,
incorporated in the State of _____

SAMPLE PROJECT PRICE PROPOSAL

On-Call Sanitary and Storm Sewer Collection System Repair and Replacement

Item No.	Item Description ⁽¹⁾	Units	Estimated Quantity ⁽²⁾	Unit Price	Total Price
A. Cured-In-Place Pipe (CIPP) Liner (Gravity Sanitary and Storm)					
A-1	Install 8-Inch Diameter (6.0 mm Thickness) Gravity Sewer CIPP Liner	LF	8,000		
A-2	Install 10-Inch Diameter (6.0 mm Thickness) Gravity Sewer CIPP Liner	LF	4,200		
A-4	Install 15-Inch Diameter (7.5 mm Thickness) Gravity Sewer CIPP Liner	LF	2,200		
A-5	Install 18-Inch Diameter (9.0 mm Thickness) Gravity Sewer CIPP Liner	LF	600		
A-6	Install 21-Inch Diameter (9.0 mm Thickness) Gravity Sewer CIPP Liner	LF	600		
A-7	Install 24-Inch Diameter (10.5 mm Thickness) Gravity Sewer CIPP Liner	LF	600		
A-8	Install 30-Inch Diameter (12.0 mm Thickness) Gravity Sewer CIPP Liner	LF	500		
A-9	Install 36-Inch Diameter (12.0 mm Thickness) Gravity Sewer CIPP Liner	LF	300		
A-11	Install 48-Inch Diameter (16.5 mm Thickness) Gravity Sewer CIPP Liner	LF	300		
	Sub-Total	-	17,300	-	
C. Excavation Required Pipe Rehabilitation (Point Repairs: Gravity Sanitary and Storm)⁽³⁾					
C-1a	Install PVC Pipe - Paved (8- to 12-Inch Dia., 0 to 10 Feet Depth)	LF	120		
C-1b	Install PVC Pipe - Unpaved (8- to 12-Inch Dia., 0 to 10 Feet Depth)	LF	120		
C-2b	Install PVC Pipe - Unpaved (15- to 21-Inch Dia., 0 to 10 Feet Depth)	LF	90		
C-3a	Install PVC Pipe - Paved (24- to 36-Inch Dia., 0 to 10 Feet Depth)	LF	90		
C-4a	Install PVC Pipe - Paved (8- to 12-Inch Dia., 10.1 to 20 Feet Depth)	LF	45		
C-4b	Install PVC Pipe - Unpaved (8- to 12-Inch Dia., 10.1 to 20 Feet Depth)	LF	60		
C-8a	Install HDPE Pipe - Paved (15- to 21-Inch Dia., 0 to 10 Feet Depth)	LF	150		
C-9a	Install HDPE Pipe - Paved (24- to 36-Inch Dia., 0 to 10 Feet Depth)	LF	120		
C-11a	Install HDPE Pipe - Paved (15- to 21-Inch Dia., 10.1 to 20 Feet Depth)	LF	45		
C-12b	Install HDPE Pipe - Unpaved (24- to 36-Inch Dia., 10.1 to 20 Feet Depth)	LF	45		
	Sub-Total	-	-	-	

On-Call Sanitary and Storm Sewer Collection System Repair and Replacement

Item No.	Item Description ⁽¹⁾	Units	Estimated Quantity ⁽²⁾	Unit Price	Total Price
D. Excavation Required Pipe Replacement (Total Pipe Replacement: Gravity Sanitary and Storm)⁽⁴⁾					
D-1a	Install PVC Pipe - Paved (8- to 12-Inch Dia., 0 to 10 Feet Depth)	LF	500		
D-1b	Install PVC Pipe - Unpaved (8- to 12-Inch Dia., 0 to 10 Feet Depth)	LF	250		
D-2a	Install PVC Pipe - Paved (15- to 21-Inch Dia., 0 to 10 Feet Depth)	LF	250		
D-2b	Install PVC Pipe - Unpaved (15- to 21-Inch Dia., 0 to 10 Feet Depth)	LF	250		
D-5a	Install PVC Pipe - Paved (15- to 21-Inch Dia., 10.1 to 20 Feet Depth)	LF	500		
D-8a	Install HDPE Pipe - Paved (15- to 21-Inch Dia., 0 to 10 Feet Depth)	LF	500		
D-11a	Install HDPE Pipe - Paved (15- to 21-Inch Dia., 10.1 to 20 Feet Depth)	LF	250		
D-14a	Install RCP - Paved (15- to 21-Inch Dia., 0 to 10 Feet Depth)	LF	500		
D-15a	Install RCP - Paved (24- to 36-Inch Dia., 0 to 10 Feet Depth)	LF	250		
D-18a	Install RCP - Paved (24- to 36-Inch Dia., 10.1 to 20 Feet Depth)	LF	250		
D-21b	Install Dual-Walled Polypropylene Pipe - Unpaved (24- to 30-Inch Dia., 0 to 10 Feet Depth)	LF	500		
	Sub-Total	-	-	-	
E. Sewer Pipe Cleaning					
E-1a	Perform 6- to 10-Inch Diameter Light Sewer Pipe Cleaning	LF	8,000		
E-2a	Perform 12- to 15-Inch Diameter Light Sewer Pipe Cleaning	LF	6,000		
E-6a	Perform 36-Inch Diameter Light Sewer Pipe Cleaning	LF	3,000		
E-4b	Perform 24-Inch Diameter Heavy Sewer Pipe Cleaning	LF	4,000		
E-9b	Perform >48-Inch Diameter Heavy Sewer Pipe Cleaning	LF	2,000		
	Sub-Total	-	23,000	-	
F. Sewer Pipe Televising					
F-1	Perform 6- to 10-Inch Diameter Sewer Pipe Televising	LF	15,000		
F-2	Perform 12- to 15-Inch Diameter Sewer Pipe Televising	LF	10,000		
F-4	Perform 24-Inch Diameter Sewer Pipe Televising	LF	6,000		
F-6	Perform 36-Inch Diameter Sewer Pipe Televising	LF	5,000		
F-9	Perform >48-Inch Diameter Sewer Pipe Televising	LF	6,000		
	Sub-Total	-	42,000	-	

On-Call Sanitary and Storm Sewer Collection System Repair and Replacement

Item No.	Item Description ⁽¹⁾	Units	Estimated Quantity ⁽²⁾	Unit Price	Total Price
G. Non-Excavation Required Manhole Rehabilitation					
G-1	Replace Manhole Frame Gasket	Each	5		
G-2a	Replace Existing Cover with UG Standard Cover	Each	5		
G-3	Install Flexible Liner	Each Manhole	4		
G-4	Repair Cracks and Joints	Each Manhole	10		
G-5	Repair and Grout Pipe Seals	Each Manhole	15		
G-6a	Repair Bench and Trough (48-Inch Dia.)	Each Manhole	2		
	Sub-Total	-	41	-	
H. Manhole Lining					
H-1a	Install Cementitious Liner (48-Inch Dia.)	Vertical Feet	110.0		
H-2a	Install Epoxy Liner (48-Inch Dia.)	Vertical Feet	16.0		
H-3a	Install Epoxy Liner in New Manhole (48-Inch Dia.)	Vertical Feet	16.0		
H-4a	Install Cementitious and Epoxy Liners (48-Inch Dia.)	Vertical Feet	32.0		
	Sub-Total	-	174.0	-	
I. Excavation Required Manhole Rehabilitation					
I-1aa	Replace Existing Frame and Cover with UG Standard Frame and Cover - Paved	Each Manhole	30		
I-1ab	Replace Existing Frame and Cover with UG Standard Frame and Cover - Unpaved	Each Manhole	10		
I-1ba	Replace Existing Frame and Cover with UG Standard Bolt Down Frame and Cover - Paved	Each Manhole	6		
I-2a	Replace Grade Adjustment - Paved	Each Manhole	30		
I-2b	Replace Grade Adjustment - Unpaved	Each Manhole	10		
I-4aa	Install Flattop on Existing Manhole (48-Inch Dia.) - Paved	Each	6		
I-5ba	Replace Existing Manhole Cone and Above (60-Inch Dia.) - Paved	Each	2		
I-7aa	Replace Existing Manhole with Precast Concrete (48-Inch Dia., 0'-8' Depth) - Paved	Each	2		
I-7ab	Replace Existing Manhole with Precast Concrete (48-Inch Dia., 0'-8' Depth) - Unpaved	Each	1		
I-8ba	Replace Existing Manhole with Polymer Concrete (60-Inch Dia., 0'-8' Depth) - Paved	Each	4		
I-9aa	Install Precast Concrete Manhole Extra Depth (48-Inch Dia.) - Paved	Vertical Feet	20		
I-9ab	Install Precast Concrete Manhole Extra Depth (48-Inch Dia.) - Unpaved	Vertical Feet	4		
I-9bb	Install Precast Concrete Manhole Extra Depth (60-Inch Dia.) - Unpaved	Vertical Feet	8		
I-10ba	Install Polymer Concrete Manhole Extra Depth (60-Inch Dia.) - Paved	Vertical Feet	6		
I-10bb	Install Polymer Concrete Manhole Extra Depth (60-Inch Dia.) - Unpaved	Vertical Feet	8		
I-11	Replace Existing Inlet with Precast Concrete Inlet (5 Feet x 3 Feet, 0 to 8 Feet Depth)	Each	3		
	Sub-Total	-	-	-	

On-Call Sanitary and Storm Sewer Collection System Repair and Replacement

Item No.	Item Description ⁽¹⁾	Units	Estimated Quantity ⁽²⁾	Unit Price	Total Price
J. Miscellaneous Construction					
J-1a	Install Inside Drop Bowl, Fittings, and Piping (8-Inch Dia. Drop)	Each	6		
Jj-2	Repair Cave-In	Each	1		
J-3a	Mow Easement for Site Access (10-Feet Wide Corridor)	LF	5000		
J-4a	Clear Easement for Site Access (10-Feet Wide Corridor)	LF	450		
J-4b	Clear Easement for Site Access (20-Feet Wide Corridor)	LF	2000		
J-5a	Remove Trees for Site Access (6- to 12-Inch Dia.)	Each	25		
J-5b	Remove Trees for Site Access (13- to 19-Inch Dia.)	Each	2		
J-5d	Remove Trees for Site Access (> 25-Inch Dia.)	Each	5		
	Sub-Total	-	-	-	
K. Hourly Work - Labor					
K-1a	Project Manager (Standard Rate)	hour	40		
K-2a	Supervisor (Standard Rate)	hour	12		
K-3b	Foreman (Overtime Rate)	hour	16		
K-4a	Equipment Operator (Standard Rate)	hour	16		
K-5d	Laborer (Holiday Rate)	hour	4		
	Sub-Total	-	-	-	

On-Call Sanitary and Storm Sewer Collection System Repair and Replacement

Item No.	Item Description ⁽¹⁾	Units	Estimated Quantity ⁽²⁾	Unit Price	Total Price
L. Hourly Work - Equipment					
L-1a	Small Excavator (<20,000 lb) (Standard Rate)	hour	8		
L-1b	Small Excavator (<20,000 lb) (Mobilization Charge)	LS	1		
L-3a	Large Excavator (> 45,000 lb) (Standard Rate)	hour	4		
L-3b	Large Excavator (> 45,000 lb) (Mobilization Charge)	LS	1		
L-5a	Skid Steer (Standard Rate)	hour	2		
L-5b	Skid Steer (Mobilization Charge)	LS	1		
	Sub-Total	-	-	-	
	TOTAL SAMPLE PROJECT PRICE PROPOSAL				

⁽¹⁾Refer to the Contract Specifications for detailed descriptions of the proposed Work, including subsidiary items.

⁽²⁾Quantities are not guaranteed. Final Payment will be based on actual quantities.

⁽³⁾Assume each point repair is 15 LF.

⁽⁴⁾Assume each replacement pipe segment is 250 LF.

TOTAL SAMPLE PROJECT PRICE PROPOSAL AMOUNT FOR ON-CALL SANITARY AND STORM SEWER COLLECTION SYSTEM

dollars and

(written)

cents

(written)

\$

(figures)

Offeror's Signature

Date

AGREEMENT

**UNIFIED GOVERNMENT OF WYANDOTTE COUNTY/KANSAS CITY, KANSAS
AGREEMENT**

THIS AGREEMENT, made this _____ day of _____, 20____, by and between the Unified Government of Wyandotte County/Kansas City, Kansas, hereinafter called "Unified Government," and

(Contractor)

as (an individual), or (a partnership), or (a corporation), hereinafter called "Contractor."

WITNESSETH: That and for in consideration of the payments and agreements hereinafter mentioned:

1. The Contractor will commence and complete the construction of the Project known as:

**Project Name: On-Call Sanitary and Storm Sewer Collection System
Repair and Replacement
Project I.D.: 6301**

2. The Contractor will furnish all the Material, supplies, tools, Equipment, labor and other services necessary for the construction and completion of the Project as generally described below.
3. The entire construction of the sanitary and storm sewer collection system as described in the Authorization encompassing all collection system installation, rehabilitation, repair, and replacement services, including, but not limited to, easement clearing, manhole rehabilitation and replacement, pipe point repairs, pipe replacement, closed circuit televising of pipes, and pipe cleaning issued by the Unified Government to the Contractor and required to be completed in accordance with the Contract Documents.
4. The specific services to be provided by the Contractor under this Agreement shall be based upon written Authorization(s) signed by the Unified Government for each individual Authorization. The Authorization shall describe the Project, the services to be performed, the amount of compensation, as herein provided, and the established time of completion. The Contractor shall, upon receipt of an Authorization, furnish the required services in relation to the Project described by the Authorization.
5. The following project goals have been established for this project: 0% Combined MBE/WBE. While MBE/WBE participation on this project is not mandated, the Contractor shall provide satisfactory documentation of good faith effort to solicit MBE/WBE participation prior to proposal submittal. Failure to comply with pre-proposal solicitation requirements, as set forth by KDHE, will nullify such Contractor's price proposal and render it nonresponsive.
6. The Contractor agrees the initial term of this Agreement shall be for the period commencing with the effective date of this Agreement and ending after one calendar

year; provided, however, this Agreement may be renewed for four additional one-year periods, subject to, and in accordance with, the terms and conditions of this Agreement.

7. The Contractor agrees the Work will be substantially complete by the dates stated in the Authorization, and the Work completed and ready for final payment in accordance with Paragraph 25.3 of the General Conditions within the time indicated in the Authorization.
8. The Unified Government and Contractor recognize that time is of the essence of this Agreement and that if the Work is not completed within the time specified in each Authorization, plus any extensions thereof allowed in accordance with the Contract Documents, Unified Government and Contractor agree that as liquidated damages for delay, but not as a penalty, Contractor shall pay Unified Government \$500.00 for each and every calendar day that expires following the time indicated in each Authorization for completion of the Work as provided in Section 24 of the General Conditions.
9. The Contractor agrees to perform and complete all the Work described in the Contract Documents for the unit prices listed in the Price Proposal Form. Actual payment shall be the sum of the products of the installed and accepted quantity of each proposal item, measured by the Engineer as described in the Contract Documents, times its unit price. The Contractor acknowledges that the unit prices listed in the Price Proposal Form contemplate the construction of all facilities complete, in conformance with the Contract Documents, and that the cost of work required by the Contract Documents for which a specific unit price is not listed is included in the unit price for the closest applicable item.
10. The Unified Government shall pay Contractor for the completion of Work in accordance with the Contract Documents and Contractor shall accept in full compensation therefore, the sum set out in each Authorization at the unit costs set out in the Contractor's Price Proposal. The contract maximum is \$2,000,000 for the initial one-year term and each mutually agreed upon renewal period for a total maximum contract price of \$10,000,000 over the five-year period, subject to annual funding and appropriation by the Unified Government.
11. It is understood that the "Engineer" representing the Unified Government shall be **Jonathan Wiles**. Any and all references to Engineer as used in the Contract Documents shall be reasonably interpreted and construed to mean or refer to the Unified Government unless otherwise specified by the Unified Government as different.
12. The term "Contract Documents" means and includes the following:
 - (a) Legal Notice of Request for Proposal
 - (b) Request for Proposal
 - (c) Proposal Questionnaire
 - (d) Price Proposal
 - (e) Amendments
 - (f) Agreement
 - (g) Labor and Material Payment Bond
 - (h) Performance Bond
 - (i) Maintenance Bond
 - (j) Appointment of Process Agent Form
 - (k) Foreign Corporation Resident Agent Designation

- (l) Notice of Award
 - (m) Notice to Proceed
 - (n) Change Orders
 - (o) Additional Written Instructions and Detailed Drawings Approved by the Engineer
 - (p) General Conditions
 - (q) Supplemental General Conditions
 - (r) Special Conditions
 - (s) Forms, including State and Federal Forms
 - (t) KDHE SRF Contract Provisions
 - (u) Technical Specifications
 - (v) Technical Provisions
 - (w) Standard Details
 - (x) Authorization(s) issued by the Unified Government to the Contractor for each specific project specified thereunder
13. The Unified Government will pay the Contractor in the manner and at such times as set forth in Section 25 of the General Conditions such amounts as required by the Contract Documents.
14. This Agreement shall be binding upon all parties hereto and their representative heirs, executor, administrators, successors, and assigns.

IN WITNESS WHEREOF, the parties hereto have executed, or caused to be executed by their duly authorized officials, an original on the date first above written.

OWNER:

**Unified Government of Wyandotte
County/Kansas City, Kansas**

By _____
County Administrator

ATTEST:

Unified Government Clerk

CONTRACTOR:

(Contractor)

By _____

Name _____

Address _____

ATTEST:

Title

**LABOR AND MATERIAL
PAYMENT BOND**

*Note to Clerk of the District Court, Wyandotte County, Kansas:
Please enter date filed and furnish case number.*

Case No. _____

Bond No. _____

KNOW ALL MEN BY THESE PRESENTS:

THAT WE,

(Name of Contractor)

as Principal, and

(Name of Surety Company)

a corporation duly organized under the laws of the State of _____, and
authorized to do business in Kansas, as Surety, are held and firmly bound unto the State of Kansas,
as Obligee hereinafter called State, for the use and benefit of claimants as hereinafter defined, in the
amount of _____

Dollars (\$ _____), for the payment whereof Principal and Surety bind themselves,
their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these
presents.

WHEREAS, Principal has by written agreement dated _____, 20____, entered into a
contract with Unified Government of Wyandotte County/Kansas City, Kansas, for

**Project Name: On-Call Sanitary and Storm Sewer Collection System
Repair and Replacement**

Project I.D.: 6301

in accordance with drawings and specifications prepared by **Engineering Division**, which contract
is by reference made a part hereof, and is hereinafter referred to as the Contract.

NOW, THEREFORE, if the said Principal or the sub-contractor or sub-contractors of said Principal
shall pay all indebtedness incurred for supplies, materials, or labor furnished, or equipment used or
consumed in connection with or in or about the construction or making of the above described
improvements, this obligation shall be void; otherwise, it shall remain in full force and effect.

Signed and sealed this _____ day of _____, 20____.

CONTRACTOR:

SURETY:

(Name of Contractor)

(Name of Surety)

(Seal)

(Seal)

By _____

By _____

(Name)

(Name)

(Title)

Attorney in Fact

(Witness)

(Witness)

Approved:

(Assistant U.G. Attorney)

PERFORMANCE BOND

*Filing of this bond with the Clerk of the District
Court is not a contract requirement*

Bond No. _____

KNOW ALL MEN BY THESE PRESENTS:

THAT WE,

(Name of Contractor)

as Principal referred to herein as Contractor, and

(Name of Surety Company)

a corporation duly organized under the laws of the State of _____, and
authorized to do business in Kansas, as Surety, are held and firmly bound unto the Unified
Government of Wyandotte County/Kansas City, Kansas, as Obligee, in the amount 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 by written agreement dated _____, 20____, entered into
a contract with the Unified Government of Wyandotte County/Kansas City, Kansas for

**Project Name: On-Call Sanitary and Storm Sewer Collection System
Repair and Replacement
Project I.D.: 6301**

in accordance with drawings and specifications prepared by **Engineering Division**, which
contract is by reference made a part hereof, 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 then this obligation shall be null and void;
otherwise it shall remain in full force and effect. The Surety hereby waives notice of any
alteration or extension of time made by the Unified Government and its obligation is not affected
by any such alteration or extension provided the same is within the scope of the Contract.
Whenever Contractor shall be, and is declared by Unified Government to be in default under the
Contract, the Unified Government having performed Unified Government's obligations
thereunder, the Surety may promptly remedy the default or shall promptly:

- (1) Complete the Contract in accordance with its terms and conditions; or
- (2) Obtain a bid or bids for completing the Contract in accordance with its terms and conditions, and upon determination by the Unified Government and the Surety jointly of the lowest responsive, responsible bidder, arrange for a contract between such bidder and the Unified Government, and make available as work progresses (even though there should be a default or a succession of defaults under the contract or contracts of completions arranged under this paragraph) sufficient funds to pay the cost of completion less the balance of the contract price; but not exceeding, including other costs and damages for which the Surety may be liable hereunder, the amount set forth in the first paragraph hereof. The term "balance of the contract price," as used in this paragraph, shall mean total amount payable by Unified Government to Contractor under the Contract and any amendments thereto, less the amount properly paid by Unified Government to Contractor. No right of action shall accrue on this bond to or for the use of any person or corporation other than the Unified Government or successors of the Unified Government.

Signed and sealed this _____ day of _____, 20____

CONTRACTOR:

SURETY:

(Name of Contractor)

(Name of Surety)

(Seal)

(Seal)

By _____

By _____

(Name)

(Name)

(Title)

Attorney in Fact

(Witness)

(Witness)

Approved:

(Assistant U.G. Attorney)

MAINTENANCE BOND

*Filing of this bond with the Clerk of the District
Court is not a contract requirement*

Bond No. _____

KNOW ALL MEN BY THESE PRESENTS:

THAT WE,

(Name of Contractor)

as Principal referred to herein as Contractor, and

(Name of Surety Company)

a corporation duly organized under the laws of the State of _____, and
authorized to do business in Kansas, as Surety, are held and firmly bound unto the Unified
Government of Wyandotte County/Kansas City, Kansas, as Obligee, in the amount 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 by written agreement dated _____, 20____, entered into
a contract with the Unified Government of Wyandotte County/Kansas City, Kansas for

**Project Name: On-Call Sanitary and Storm Sewer Collection System
Repair and Replacement
Project I.D.: 6301**

in accordance with drawings and specifications prepared by **Engineering Division**, which
contract is by reference made a part hereof, and is hereinafter referred to as the Contract.

Whereas, the Principal agrees to guarantee the work hereinabove described, including all
materials and workmanship, for the period of three (3) year(s) beginning on the date the
Obligee so accepts said work, said date being the formal acceptance date.

NOW, THEREFORE, if the Principal shall and will, in all particulars, well, duly, and faithfully
observe, perform and abide by each and every covenant, condition and part of said written
agreement and other Contract Documents and shall protect the Obligee against all damages,
losses and expenses which may occur to Obligee, by reason of defective materials used, or by
reason of defective workmanship done, for, and the construction of said work; and shall, if
necessary, refill all excavation in such manner that it shall be, and shall remain, for the period
of three (3) years, flush with adjacent surfaces; and shall repair, if necessary, for said period of

Maintenance Bond

three (3) years, all surfaces adjacent to said work if such surfaces are damaged as the result of settlement of backfill of excavated areas; and shall guarantee the above work for a period three (3) years from date formal acceptance, then this obligation shall become null and void; otherwise, it shall remain in full force and effect.

Signed and sealed this _____ day of _____, 20____

CONTRACTOR:

SURETY:

(Name of Contractor)

(Name of Surety)

(Seal)

(Seal)

By _____

By _____

(Name)

(Name)

(Title)

Attorney in Fact

(Witness)

(Witness)

Approved:

(Assistant U.G. Attorney)

**UNIFIED GOVERNMENT OF WYANDOTTE COUNTY/KANSAS CITY, KANSAS
APPOINTMENT OF PROCESS AGENT FORM**

_____, as CONTRACTOR, having entered into written agreement, dated _____, 20____, for construction of certain public work described as **Project Name: On-Call Sanitary and Storm Sewer Collection System Repair and Replacement**

Project ID: 6301

does hereby appoint _____,
whose address is _____,
Kansas, as process agent, in compliance with the requisites of Section 16-113, General Statutes of Kansas as amended, 1980.

Duly executed this _____ day of _____, 20____.

Contractor _____

By _____

Title _____

Processing instructions:

1. *A Contractor who is doing business as an individual, a partnership, or an unincorporated association and who is not a resident of the State of Kansas shall execute this document.*
2. *Contractor shall file one copy of this document with the Clerk of the District Court of Wyandotte County, and one copy with the City's contracting agency.*
3. *Pursuant to paragraph 13 of the Instructions and Information to Bidders a contract will not be executed until this form is completed and filed.*

FOREIGN CORPORATION RESIDENT AGENT DESIGNATION

Contractor is a corporation, and is not incorporated in the State of Kansas. Contractor must be authorized to do business in the State of Kansas in accordance with K.S.A. 17-7301. Contractor designates below a resident agent in the State of Kansas as required by K.S.A. 17-6202 and 17-7301, and as specified elsewhere herein.

Resident Agent

Name and Address

Processing instructions:

- 1. A Contractor who is a corporation and is not incorporated in the State of Kansas shall execute this document.*
- 2. Contractor shall file one copy of this document with the City's contracting agency.*
- 3. Pursuant to paragraph 13 of the Instructions and Information to Bidders a contract will not be executed until this form is completed and filed.*

CONDITIONS OF THE CONTRACT

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UNIFIED GOVERNMENT OF WYANDOTTE
COUNTY/KANSAS CITY, KANSAS
GENERAL CONDITIONS

1. **DEFINITIONS:** Wherever used in the Invitation for Bids, the following terms shall have the meanings indicated which shall be applicable to both the singular and plural and/or of either sex thereof:

1.1 **AMENDMENT** – Written or graphic instruments issued prior to the opening of Bids which modify or interpret the Invitation for Bids by additions, deletions, clarifications or corrections.

1.2 **AGREEMENT** – The Unified Government's Agreement Form voluntarily signed and witnessed by the Unified Government and Contractor and made a part of the Contract Documents.

1.3 **BID** – The offer or proposal of the bidder submitted on the prescribed form setting forth the prices for the Work to be performed.

1.4 **BIDDER** – Any person, firm or corporation submitting a Bid for the Work.

1.5 **BONDS** – Bid, performance and payment bonds and other instruments of security, furnished by the contractor and his surety in accordance with the Invitation for Bids.

1.6 **CHANGE ORDER** - a written order signed by the Procurement Officer, directing the contractor to make changes which the Changes clause of the contract authorizes the Procurement Officer to order without the consent of the contractor.

1.7 **UNIFIED GOVERNMENT** – The Unified Government of Wyandotte County/Kansas City, Kansas, a Municipal Corporation.

1.8 **CONSULTANT** – A person, firm or corporation contracted with by the Unified Government to perform specific technical or professional tasks as set forth in the signed written agreement between the Unified Government and Consultant.

1.9 **CONTRACT DOCUMENTS** – The contract including Legal Notice of Invitation for Bids, Instructions and Information to Bidders, executed Bid Form, Bid Bond, Amendments, Agreement, Payment Bond, Performance Bond, Notice of Award, Notice to Proceed, Change Order, additional written instruction and detailed drawings approved by the Engineer/Architect, Drawings, general Conditions, Supplemental General Conditions, Special Conditions, Technical Provisions.

1.10 **CONTRACT PRICE** – The total monies payable to the Contractor under the terms and conditions of the Contract Documents.

1.11 **CONTRACT TIME** – The number of days stated in the Contract Documents for the completion of the Work. Time shall be measured in calendar days or working days as specified in the Agreement.

1.12 **CONTRACTOR** – The person, firm or corporation with whom the Unified Government has executed the Agreement.

1.13 **DAYS** – Except for calculation of Contract Time when working days are specified, all periods of time prescribed in the Contract Documents shall be measured in calendar days. In computing time the day of the event from which the designated period of time begins to run shall not be included, but the last day of the period shall be included unless it is Saturday, Sunday, or a Unified Government holiday, in which event the period shall run to the end of the next business day.

1.14 **DRAWINGS** – The part of the Contract Documents which show the characteristics and scope of the Work to be performed and which have been prepared and/or approved by the Engineer/Architect.

1.15 **ENGINEER/ARCHITECT** - The Procurement Officer or his designee, or the Consultant hired by the Unified Government to perform professional services as designated in the Agreement.

1.16 **EQUIPMENT** – All machinery and equipment, together with the necessary supplies for operation, upkeep and maintenance, and also tools and apparatus necessary for the proper construction and acceptable completion of the work.

1.17 **INVITATION FOR BIDS** – All documents, whether attached or incorporated by reference, utilized for soliciting bids, including but not limited to the Legal Notice of Invitation for Bids, Instructions and Information to Bidders, General Conditions, Supplemental General Conditions, Technical Provisions, Special Conditions, Agreement Form, Bid Form, Bond Forms, EEO Requirements, Drawings and Amendments.

1.18 **MANUFACTURER** – The person, firm or corporation responsible for the commercial manufacturing, assembling or processing of materials and/or equipment to be incorporated in the Project.

1.19 **MATERIAL** – Any substance specified for use in the construction of the project and its appurtenances.

1.20 **MONUMENT** – A boundary marker.

1.21 **NOTICE OF AWARD** – The written notice of the acceptance of the Bid by the Unified Government to the successful Bidder.

1.22 **NOTICE TO PROCEED** – A written notice issued by the Unified Government to the Contractor authorizing him to proceed with the Work and establishing the date of commencement of the Contract Time.

1.23 **PROCUREMENT CODE** – The Procurement Code of the Unified Government of Wyandotte County/Kansas City, Kansas, effective June 27, 1983 by ordinance Number 64497, and amendments thereto. This document may be viewed during normal business hours in the office of the Unified Government Clerk.

1.24 **PROCUREMENT OFFICER** – Any person duly authorized to administer contracts and make written determinations with respect thereto. The term also includes an authorized representative acting within the limits of authority.

1.25 **PROCUREMENT REGULATION** – The Procurement Regulations of the Unified Government of Wyandotte County/Kansas City, Kansas, effective June 27, 1983, and amendments thereto. This document may be viewed during normal business hours in the office of the Unified Government Clerk.

1.26 **PROJECT** – The undertaking to be performed as provided in the Contract Documents with payment to the Contractor from the Unified Government.

1.27 **PROJECT REPRESENTATIVE** – The Engineer/Architect's agent assigned to the project site who shall act under the supervision and direction of the Engineer/Architect. He shall confer with the Engineer/Architect regarding his actions, and shall generally communicate with the Unified Government only through the Engineer/Architect.

1.28 **SHOP DRAWINGS** – All drawings, diagrams, illustrations, brochures, schedules and other data which are prepared by the Contractor, a Subcontractor, Manufacturer, Supplier or Distributor, which illustrate how specific portions of the Work will be fabricated, installed, formed or constructed.

1.29 **SPECIFICATIONS** – A part of the Contract Documents consisting of written descriptions of a technical nature of materials, equipment, construction systems, standards and workmanship, including Technical Provisions and Special Conditions.

1.30 **SPECIAL CONDITIONS** – A part of the Contract Documents being a modification, amplification and/or additional information of the General, or Supplemental General Conditions or Technical Provisions.

1.31 **SPECIFIED COMPLETION DATE** – The date on which the contract work is specified to be completed.

1.32 **SUBCONTRACTOR** – An individual, firm or corporation having a direct contract with the Contractor or with any other Subcontractor for the performance of a part of the Work at the site.

1.33 **SUBSTANTIAL COMPLETION** – That date as certified by the Engineer/Architect when the construction of the Project or a specified part thereof is sufficiently completed in accordance with the Contract Documents, so that the Project or specified part can be utilized for the purposes for which it is intended.

1.34 **SUPPLEMENTAL GENERAL CONDITIONS** – A part of the Contract Documents consisting of modifications and additions to the General Conditions or Instructions to Bidders that are applicable to a specific projects of procurement agency.

1.35 **SUPPLIER** – Any person, firm, corporation or organization who supplies Materials or Equipment for the Work, including that fabricated to a special design, but who does not perform labor at the site.

1.36 **SURETY** – The corporation, partnership or

individual, other than the Contractor, executing a bond furnished by the Contractor.

1.37 **TECHNICAL PROVISIONS** – A part of the Contract Documents consisting of written descriptions of a technical nature of materials, equipment, construction systems, standards and workmanship required for the Project.

1.38 **WORK** – All labor, equipment and tools necessary to produce the construction required by the Contract Documents, and all materials and equipment incorporated or to be incorporated in the Project.

1.39 **WORKING DAY** When working days are specified, a working day shall be any day from the starting date through the completion of the project except as follows:

a. Saturdays, Sundays, Unified Government holidays, and the dates from December 24 through January 2, inclusive, unless the Contractor requests and receives permission to work on these dates.

b. Days on which adverse weather, or conditions immediately resulting from adverse weather, prevent work on the controlling item for at least 50% of the total daily time.

c. Days on which the current controlling item is delayed or suspended due to acts of the Engineer/Architect for at least 50% of the total daily time.

d. Days on which correction of differing site conditions prevent work on the current controlling item for at least 50% of the total daily time. Differing site conditions shall be those listed in General Condition 16.1.

Only whole days will be counted. On non-working days Contractor may, at his option and with no count against the contract time, pursue any work not affected by weather or other conditions affecting the controlling item.

The current controlling item is that feature or features of the work which if delayed or prolonged, at the time in question, will delay the completion of the project. The controlling item may be an activity or it may be a curing period or other mandatory waiting period. Working and non-working days shall be determined and recorded at regular intervals by the Engineer/Architect. Contractor shall review calculation of time and resolve any differences with the Engineer/Architect prior to each partial pay submittal.

1.40 **WRITTEN NOTICE** – Any notice to any party to the Agreement in writing the service thereof completed, when posted by certified or registered mail to the said party at his last given address, or delivered in person to said party or his authorized representative on the Work, or so mailed or delivered to the party listed with the Clerk of the District Court of Wyandotte County as the Contractor's Process Agent.

2. ADDITIONAL INSTRUCTIONS AND DETAIL DRAWINGS.

2.1 The Contractor may be furnished additional

written instructions and detail drawings, by the Engineer/Architect, as necessary to carry out the Work required by the Contract Documents.

2.2 The Contractor shall carry out the Work in accordance with the additional written instructions and detail drawings.

3. SCHEDULES, REPORTS AND RECORDS FOR PUBLIC PROJECTS.

3.1 The Contractor shall submit to the Engineer/Architect such schedule of quantities and costs, progress schedules, payrolls, reports, estimates record and other data where applicable as are required by the Contract Documents for the Work to be performed.

3.2 Prior to the commencement of Work, the Contractor shall submit construction progress schedules showing the order in which he proposes to carry on the Work, including dates at which he will start the various parts of the Work, estimated date of completion of each part and, as applicable, the dates at which special detail drawings will be required, and respective dates of submission of Shop Drawings, the beginning of manufacture, the testing and the installation of materials, supplies and equipment.

3.3 The Contractor shall also submit a schedule of payments that he anticipates he will earn during the course of the Work.

4. DRAWINGS AND SPECIFICATIONS.

4.1 The intent of the Drawings and Specifications is that the Contractor shall furnish all labor, materials, tools, equipment, and transportation necessary for the proper execution of the Work in accordance with the Contract Documents and all incidental work necessary to complete the Project in an acceptable manner, ready for use, occupancy or operation by the Unified Government.

4.2 In case of conflict between the Drawings and Specifications, the drawings shall govern. Figure dimensions on Drawings shall govern over scale dimensions, and detailed Drawings shall govern over general Drawings. Special Conditions shall govern over Technical Provisions and the General Conditions.

4.3 Any discrepancies, inconsistencies, or ambiguities found between the Drawings or Specifications shall be immediately reported to the Engineer/Architect, in writing, who shall promptly correct them in writing. Work done by the Contractor after his discovery of such discrepancies, inconsistencies or ambiguities, but before correction by the Engineer/Architect, shall be done at the Contractor's risk.

5. SHOP DRAWINGS.

5.1 Where required by the special conditions or technical provisions, the Contractor shall provide to the Engineer/Architect not less than 4 copies of all Shop Drawings which bear the certification that the Contractor has reviewed, checked and approved the Shop Drawings and that they are in conformance with the requirements of the Contract Documents. The Contractor shall also note on the Shop Drawings all

deviations from the Contract Documents. The Engineer/Architect's approval of any Shop Drawing shall not release the Contractor from responsibility for deviations from the Contract Documents. The Engineer/Architect may elect not to review shop drawings not required by the contract documents. The approval of any Shop Drawing which substantially deviates from the requirement of the Contract Documents shall be evidenced by a Change order. If the Contractor requires more than 1 copy returned of "approved" or "approved if corrected as noted" drawings, additional copies shall be included in original submittal with all additional copies returned to the Contractor.

5.2 The review action by the Engineer/Architect will be as shown:

Action By <u>Engineer</u>	Retained By <u>Engineer</u>	Required <u>Resubmittal</u>
Approved	3	no
Approved if Corrected as Noted	3	no
Correct and Resubmit	1	yes
Not Approved	1	yes

5.3 Portions of the Work requiring a Shop Drawing or sample submission shall not begin until the Shop Drawing or sample has been approved by the Engineer/Architect. A copy of each approved Shop Drawing and each approved sample shall be kept in good order by the Contractor at the site and shall be available to the Engineer/Architect.

6. MATERIALS, SERVICES AND FACILITIES.

6.1 It is understood that, except as otherwise specifically stated in the Contract Documents, the Contractor shall provide and pay for all Materials, labor, tools, Equipment, water, light, power, transportation, supervision, temporary construction of any nature, and all other services and facilities of any nature whatsoever necessary to execute, complete, and deliver the Work within the specified time.

6.2 Contractor shall furnish only new Material of the type, size, and strength class with all accessories as specified, indicated and/or necessary for a completed project.

6.3 Manufacturer of Material to be incorporated within the project shall be experienced in the design, manufacture, testing, and commercial supplying of the specified materials.

6.4 Materials and Equipment shall be so transported, stored and installed as to insure the preservation of their quality and fitness for the Work. Said transporting, handling and storage shall conform to the Manufacturer's recommendations unless otherwise required in the Contract Documents. Stored Materials and Equipment to be incorporated in the Work shall be located so as to facilitate prompt inspection.

6.5 Damaged Materials will be subject to rejection and cannot be incorporated within the project without written approval from the Engineer/Architect.

6.6 Manufactured articles, Materials and Equipment shall be applied, installed, connected, erected, used, cleaned and conditioned as directed by the Manufacturer unless otherwise specifically stated in the Contract Documents.

6.7 Contractor shall submit to the Engineer/Architect six (6) copies each of Manufacturer's design, Material specifications, quality control methods, recommended installation instructions, warranties, delivery dates, manufacturing location and if specifically requested samples of Materials to be incorporated within the Project for approval. Purchase of Materials not approved by the Engineer/Architect will be done only at the Contractor's risk.

6.8 Materials, supplies and Equipment shall be in accordance with samples submitted by the Contractor and approved by the Engineer/Architect.

6.9 Materials, supplies or Equipment to be incorporated into the Work shall not be purchased by the Contractor or the Subcontractor subject to a chattel mortgage or under a conditional sale contract or other agreement by which an interest is retained by the seller.

6.10 Contractor shall require, secure and submit to the Engineer/Architect six (6) copies of all material certifications and test transcripts for all Materials incorporated within the Project. Material testing shall be performed by the Manufacturer's quality control personnel and/or approved independent testing laboratory, all in conformance with applicable and acceptable standards. Provisions shall be made that the Engineer/Architect and/or approved independent test laboratory personnel may witness such tests. Failure of the Engineer/Architect to reject Materials will not be grounds for acceptance if defects are later found; however, all Materials rejected by the Engineer/Architect as unsuitable, nonconforming and/or failing to meet minimum required test results shall not be used and shall be removed from the Project site by the Contractor.

7. INSPECTION AND TESTING.

7.1 All Materials and Equipment used in the construction of the Work shall be subject to adequate inspection and testing in accordance with generally accepted standards, as required and defined in the Contract Documents.

7.2 Tests and certifications are required to demonstrate that all products installed in the work comply with the specifications. Responsibility for testing shall be as indicated below:

- a. City is responsible for acceptance tests on installed products and on products delivered for installation; such as field or laboratory tests for slump, air and strength of concrete, temperature of asphalt mixes, reference and relative density of asphalt mixtures, reference and relative density of embankment and fill material,

infiltration/ exfiltration test and televising of sewer mains, thickness and surface straight edging, and the like; except for those tests listed in "c." below. Engineer/Architect shall determine the time, location, and frequency of field testing and sampling. Upon request the Unified Government will provide Contractor with one copy of test results.

If Contractor has reasonable objection to the testing laboratory employed by the Unified Government, Contractor shall submit a written protest using the procedure for claims based on procurement officer's actions or omissions.

b. Contractor shall reimburse the Unified Government for tests performed by the Unified Government when the results of those tests do not meet specified limits.

c. Contractor and his suppliers are responsible for process control tests normally conducted at the source of supply, such as certifications of manufactured products, concrete and asphalt mix designs, mixing plant quality monitoring tests, gradation tests of pipe bedding and imported fill material, fertilizer and seed certifications, and the like. Submittal of tests and certifications shall follow the procedures for shop drawings.

Contractor shall be responsible for the following field tests: tightness testing of manholes and sewer lines; mandrel testing of non-rigid sewer mains; start-up, demonstration and adjustment of HVAC, mechanical, electrical, or communication systems; and profilograph testing of concrete and asphalt pavements where required by the technical specifications, special conditions, or drawings. When profilograph testing is ordered by the Engineer because of poor subjective ride quality, compensation for the testing shall be based on General Condition 7.7.

d. Contractor shall employ an independent commercial laboratory, acceptable to the Engineer, to conduct source of supply tests. The laboratory shall have the staff, equipment, qualifications, and experience to perform the tests in accordance with the specified standards.

e. Contractor shall cooperate with Unified Government's field testing and sampling; interrupting, exposing and repairing the work when necessary and providing labor, sample material, and facilities to accommodate the testing and sampling.

7.3 If the Contract Documents, laws, ordinances, rules, regulations or orders of any public authority having jurisdiction require any Work to be specifically inspected, tested, or approved by someone other than the Contractor, the Contractor will give the Engineer/Architect timely notice of readiness. The Contractor will then furnish the Engineer/Architect the required certificates of inspection, testing or approval.

7.4 Inspections, test or approvals by the Engineer/Architect or others shall not relieve the

Contractor from his obligations to perform the Work in accordance with the requirements of the Contract Documents.

7.5 The Engineer/Architect and/or his representatives will at all times have access to the Work. In addition, authorized representatives and agents of any participating Federal, State or local agency shall be permitted to inspect all Work, Materials, payrolls, records of personnel, invoices of Material, and other relevant data and records. The Contractor will provide proper facilities for such access and observation of the Work and also for any inspection, or testing thereof.

7.6 If any Work is covered contrary to the instructions of the Engineer/Architect or his project representative, or if Work is covered prior to inspection required by the Contract Documents, said Work must, if requested by the Engineer/Architect, be uncovered for inspection and replaced at the Contractor's expense

7.7 If after the Work is covered in accordance with the Engineer/Architect's instructions and the requirements of the Contract Documents the Engineer/Architect subsequently issues instructions to uncover the Work for inspection, the contractor shall uncover the Work in question. If it is found that such Work is defective, the Contractor will bear all the expenses of such uncovering, inspection and reconstruction. If, however, such Work is not found to be defective, the Contractor will be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to such uncovering, inspection, and reconstruction and an appropriate Change Order shall be issued

8. SUBSTITUTIONS.

8.1 Whenever Material or Equipment is identified on the Drawings or Specifications by reference to brand name or catalogue number, it shall be understood that this is referenced for the purpose of defining the performance or other salient requirements and not to limit competition, and that other products of equal capacities, quality and function shall be considered. The Contractor may recommend the substitution of material, article, or piece of equipment of equal substance and function for those referred to in the Contract Documents by reference to brand name or catalogue number, and if, in the opinion of the Engineer/Architect, such material, article, or piece of equipment is of equal substance and function to that specified, the Engineer/Architect may approve its substitution and use by the Contractor. Any cost differential shall be deductible from the Contract Price and the Contract Documents shall be appropriately modified by Change Order. The contractor warrants that if substitutes are approved, no major changes in the function or general design of the Project will result. Incidental changes or extra component parts required to accommodate the substitute will be made by the Contractor without a change in the Contract Price or Contract Time.

9. PATENTS.

9.1 The Contractor shall pay all applicable royalties

and license fees. He shall defend all suits or claims for infringement of any patent rights and save the Unified Government, Engineer/Architect, or Consultants harmless from loss on account thereof, except that the Unified Government shall be responsible for any such loss when a particular process, design, or the product of a particular Manufacturer or Manufacturers is specified. However, if the Contractor has reason to believe that the design, process or product specified is an infringement of a patent, he shall be responsible for such loss unless he promptly gives such information to the Engineer/Architect.

10. CONSTRUCTION STAKING.

10.1 The Contractor shall perform all construction staking; completed staking shall be reviewed by the Engineer/Architect before work commences

10.2 The Owner will furnish necessary boundary surveys and establish all baselines for locating the principal component parts of the Work, together with a suitable number of bench marks adjacent to the Work as shown in the Contract Documents.

10.3 The Contractor shall retain or provide a Land Surveyor, licensed to practice in the State of Kansas, to develop and make any detailed surveys necessary for the construction of the Work.

10.4 The Contractor shall carefully preserve bench marks, reference points and stakes and, in case of willful or careless destruction by his operations, or those of his Subcontractors or Material suppliers, he shall be charged with the resulting expense and shall be responsible for any mistakes that may be caused by their unnecessary loss or disturbance.

11. PROTECTION OF WORK, PROPERTY AND PERSONS.

11.1 The Contractor will be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. He will take all necessary precautions for the safety of, and will provide the necessary protection to prevent damage, injury or loss to all employees on the Work and other persons who may be affected thereby, all the Work and all Materials or Equipment to be incorporated therein, whether in storage on or off the site, and other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.

11.2 The Contractor will comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction. He will erect and maintain, as required by the conditions and progress of the Work, all necessary safeguards for safety and protection. He will notify owners of adjacent utilities forty-eight (48) hours in advance when prosecution of the Work may affect them. The Contractor will remedy all damage, injury or loss to any property caused, directly or indirectly, in whole or in part, by the Contractor, any Subcontractor or anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable, except damage or loss attributable to the fault of the Contract Documents or to the acts or omissions of the Unified

Government or the Engineer/Architect or consultant or anyone employed by any of them or anyone for whose acts either of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of the Contractor.

11.3 In emergencies affecting the safety of persons or the Work or property at the site or adjacent thereto, the Contractor, without special instruction or authorization from the Engineer/Architect or Unified Government, shall act to prevent threatened damage, injury or loss. He will give the Engineer/Architect prompt Written Notice of any significant changes in the Work or deviations from the Contract Documents caused thereby, and a Change Order shall thereupon be issued covering the changes and deviations involved.

12. SUPERVISION BY CONTRACTOR.

12.1 The Contractor will supervise inspect and direct the Work. He will be solely responsible for the mean methods, techniques, procedures and safety of construction. Except where limited by the Engineer/Architect's authority to adjust schedule to meet objectives listed in Condition 33.2, the Contractor shall be responsible for sequence of the work. The Contractor will employ and maintain on the Work a qualified superintendent who has full knowledge of and prior experience with the Materials and methods necessary to conform with the terms of and intent of these Contract Documents and who shall have been designated to the Engineer/Architect in writing by the Contractor as the Contractor's representative at the site. The superintendent shall have full authority to act on behalf of the Contractor and all communications given to the superintendent shall be as binding as if given to the Contractor. The superintendent shall be present on the site at all times.

12.2 The Contractor shall not change the superintendent without prior approval of the Engineer/Architect, except if the superintendent leaves the Contractor's employment.

13. CHANGES.

13.1 CHANGE ORDER – The Procurement Officer, at any time, and without notice to the sureties, in a signed writing designated or indicated to be a Change Order, may order:

- a. changes in the work within the scope of the Contract Documents; and
- b. changes in the time for performance of the Work that do not alter the scope of the Contract Documents.

13.2 ADJUSTMENTS OF PRICE OR TIME FOR PERFORMANCE – If any such Change Order increases or decreases the Contractor's cost of, or the time required for, performance of any part of the Work under these Contract Documents, whether or not changed by the order, an adjustment shall be made and the Contract Documents modified in writing accordingly. Any adjustment in Contract Price made pursuant to this clause shall be determined in accordance with the Price Adjustment Clause of these Contract Documents. (Section 14 of the General

Conditions).

Failure of the parties to agree to an adjustment shall not excuse a Contractor from proceeding with the Work as changed, provided that the Unified Government promptly and duly make such provisional adjustments in payments or time for performance as may be reasonable. By proceeding with the Work, the Contractor shall not be deemed to have prejudiced any claim for additional compensation, or an extension of time for completion.

13.3 WRITTEN CERTIFICATION – The Contractor shall not perform any Change Order in excess of \$500 unless it bears, or the Contractor has separately received, a written certification, signed by the Fiscal Officer, that funds are available therefore; and, if acting in good faith, the Contractor may rely upon the validity of such certification.

13.4 TIME PERIOD FOR CLAIM – Within 30 days after receipt of a written Change Order under Paragraph (1) of this clause, unless such period is extended by the Procurement Officer in writing, the Contractor shall file notice of intent to assert a claim for an adjustment. Later notification shall not bar the Contractor's claim unless the Unified Government is prejudiced by the delay in notification.

13.5 CLAIM BARRED AFTER FINAL PAYMENT – No claim by the Contractor for an adjustment hereunder shall be allowed if notice is not given prior to final payment under these Contractor Documents.

13.6 CLAIMS NOT BARRED – In the absence of such a Change Order, nothing in the Contract Documents shall restrict the Contractor's right to pursue a claim arising under the Contract Documents if pursued in accordance with the Clause entitled "Claims Based on a Procurement Officer's Actions or Omissions" (Section 22 of the General Conditions) or for breach of contract.

14. PRICE ADJUSTMENT.

14.1 PRICE ADJUSTMENT METHODS – Any adjustment in Contract Price pursuant to clauses in these Contract Documents shall be made in one or more of the following ways:

- a. by agreement on a fixed price adjustment before commencement of the pertinent performance or as soon thereafter as practicable;
- b. by unit prices specified in the Contract Documents or subsequently agreed upon;
- c. by the costs attributable to the event or situation covered by the clause, plus appropriate profit or fee, all as specified in the Contract Documents or subsequently agreed upon;
- d. in such other manner as the parties may mutually agree; or
- e. in the absence of agreement between the parties, by a unilateral determination by the Procurement Officer of cost attributable to the event or situation covered by the clause, plus appropriate profit or fee, all as computed by the Procurement Officer in accordance with

generally accepted accounting principles and applicable sections of the regulations promulgated under Article 7 (Cost Principles) and subject to the provisions of Article 9 (Legal and Contractual Remedies) of the Procurement Code.

14.2 SUBMISSION OF COST OR PRICING DATA – The Contractor shall submit cost or pricing data for any price adjustments subject to the provisions of Section 3-303 (Cost or Pricing Data) of the Procurement Code.

15. VARIATIONS IN ESTIMATED QUANTITIES.

15.1 VARIATIONS REQUIRING ADJUSTMENTS – Where the quantity of a pay item in these Contract Documents is an estimated quantity and where the actual quantity of such pay item varies more than 15% above or below the estimated quantity stated in these Contract Documents, an adjustment in the Contract Price shall be made upon demand of either party. The adjustment shall be based upon any increase or decrease in costs due solely to the variation above 115% or below 85% of the estimated quantity. If the quantity variation is such as to cause an increase in the time necessary for completion, the Procurement Officer shall, upon receipt of a timely written request for an extension of time, prior to the date of final settlement, ascertain the facts and make such adjustment for extending the completion date as in the judgment of the Procurement Officer the findings justify.

15.2 ADJUSTMENTS OF PRICE – Any adjustment in Contract Price made pursuant to this clause shall be determined in accordance with the Price Adjustment Clause of this contract. (Section 14 of the General Conditions).

16. DIFFERING SITE CONDITIONS, PRICE ADJUSTMENTS.

16.1 NOTICE – The Contractor shall promptly, and before such conditions are disturbed, notify the Engineer/Architect of:

- a. subsurface or latent physical conditions at the site differing materially from those indicated in these Contract Documents; or
- b. unknown physical conditions at the site, of an unusual nature, differing materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in these Contract Documents.

16.2 ADJUSTMENTS OF PRICE OR TIME FOR PERFORMANCE – After receipt of such notice, the Engineer/Architect shall promptly investigate the site, and if it is found that such conditions do materially so differ and cause an increase in the Contractor's cost of, or the time required for, performance of any part of the Work under these Contract Documents, whether or not changed as a result of such conditions, an adjustment shall be made and the Contract Documents modified in writing accordingly. Any adjustment in Contract Price made pursuant to this clause shall be determined in accordance with the Price Adjustment Clause of this contract. (Section 14 of the General Conditions.)

16.3 TIMELINESS OF CLAIM – No claim of the Contractor under this clause shall be allowed unless the Contractor has given the notice required in this clause; provided, however, that the time prescribed therefore may be extended by the Procurement Officer in writing.

16.4 NO CLAIM AFTER FINAL PAYMENT – No claim by the Contractor for an adjustment thereunder shall be allowed if asserted after final payment under these Contract Documents.

16.5 KNOWLEDGE – Nothing contained in this clause shall be grounds for an adjustment in compensation if the Contractor had actual knowledge of the existence of such conditions prior to the submission of bids.

17. TIME FOR COMPLETION.

17.1 The date beginning and the time for completion of the Work are essential conditions of the Contract Documents and the Contract Time shall commence on a date specified in the Notice to Proceed.

17.2 The Contractor will proceed with the Work at such rate of progress to insure full completion within the Contract Time. It is expressly understood and agreed, by and between the Contractor and the Unified Government that the Contract Time for the completion of the Work described herein is a reasonable time, taking into consideration the average climatic and economic conditions and other factors prevailing in the locality of the Work.

18. TERMINATION FOR DEFAULT FOR NON-PERFORMANCE OR DELAY – DAMAGES FOR DELAY – TIME EXTENSIONS.

18.1 DEFAULT – If the Contractor refuses or fails to prosecute the Work, or any separable part thereof, with such diligence as will assure its completion within the time specified in these Contract Documents, or any extension thereof, fails to complete said Work within such time, or commits any other substantial breach of these Contract Documents, and further fails within 14 days after receipt of written notice from the Procurement Officer to commence and continue correction of such refusal or failure with diligence and promptness, the Procurement Officer may, by written notice to the Contractor, declare the Contractor in breach and terminate the Contractor's right to proceed with the Work or such part of the Work as to which there has been delay. In such event the Unified Government may take over the Work and prosecute the same to completion, by contract or otherwise, and may take possession of, and utilize in completing the Work, such Materials, appliances, and plant as may be on the site of the Work and necessary therefore. Whether or not the Contractor's right to proceed with the work is terminated, the Contractor and the Contractor's sureties shall be liable for any damage to the Unified Government resulting from the Contractor's refusal or failure to complete the work within the specified time.

18.2 LIQUIDATED DAMAGES UPON TERMINATION – If fixed and agreed liquidated damages are provided in these Contract Documents, and if the Unified Government so terminates the

Contractor's right to proceed, the resulting damage will consist of such liquidated damages for such reasonable time as may be required for final completion of the Work.

18.3 LIQUIDATED DAMAGES IN ABSENCE OF TERMINATION – If fixed and agreed liquidated damages are provided in the Contract Documents, and if the Unified Government does not terminate the Contractor's right to proceed, the resulting damage will consist of such liquidated damages until the Work is completed or accepted.

18.4 TIME EXTENSION – The Contractor's right to proceed shall not be so terminated nor the Contractor charged with resulting damage if:

- a. the delay in the completion of the Work arises from causes such as: acts of God; acts of the public enemy; acts of the Unified Government or any other governmental entity in either a sovereign or contractual capacity; acts of another Contractor in the performance of a contract with the Unified Government; fires; floods; epidemics; quarantine restrictions; strikes or other labor disputes; freight embargoes; unusually severe weather; delays of Subcontractors due to causes similar to those set forth above; or shortage of Materials; provided, however, that no extension of time will be granted for a delay caused by a shortage of Materials, unless the Contractor furnishes to the Engineer/Architect proof that the Contractor has diligently made every effort to obtain such Materials from all known sources within reasonable reach of the Work, and further proof that the inability to obtain such Materials when originally planned did in fact cause a delay in final completion of the entire Work which could not be compensated for by revising the sequence of the Contractor's operations; and
- b. the Contractor, within ten days from the beginning of any such delay (unless the Procurement Officer grants a further period of time before the date of final payment under the Contract Documents), notifies the Engineer/Architect in writing of the causes of delay. The Procurement Officer shall ascertain the facts and the extent of the delay and extend the time for completing the Work when, in the judgment of the Procurement Officer, the findings of fact justify such an extension.

18.5 ERRONEOUS TERMINATION FOR DEFAULT – If, after notice of termination of the Contractor's right to proceed under the provisions of this clause, it is determined for any reason that the Contractor was not in default under the provisions of this clause, or that the delay was excusable under the provisions of this clause, the rights and obligations of the parties shall be the same as if the notice of termination had been issued pursuant to the Termination for Convenience clause. (Section 23 of the General Conditions.)

18.6 Where the Contractor's services have been so terminated by the Unified Government, said termination shall not affect any right of the Unified

Government against the Contractor then existing or which may thereafter accrue. Any retention or payment of monies by the Unified Government will not release the Contractor from compliance with the Contract Documents.

18.7 ADDITIONAL RIGHTS AND REMEDIES – The rights and remedies of the Unified Government provided in this clause are in addition to any other rights and remedies provided by law or under these Contract Documents.

19. SPECIFIC ACTS CONSTITUTING SUBSTANTIAL BREACH.

19.1 The following acts committed by the Contractor will constitute a substantial breach of the Contract Documents and may result in termination of the Work.

- a. If the Contractor is adjudged bankrupt or insolvent.
- b. If the Contractor makes a general assignment for the benefit of his creditors.
- c. If a trustee or receiver is appointed for the Contractor or any of his property.
- d. If the Contractor files a petition to take advantage of any debtor's act or to reorganize under the bankruptcy or applicable laws.
- e. If Contractor repeatedly fails to supply sufficient skilled workmen or suitable Material or Equipment.
- f. If the Contractor repeatedly fails to make prompt payments to Subcontractors or for labor, Material or Equipment.
- g. If the Contractor disregards ordinances, rules, regulations or orders of any public body having jurisdiction of the Work.
- h. If the Contractor disregards the authority of the Purchasing Officer or consultant.

19.2 Acts other than those specified in 19.1 may constitute substantial breach.

19.3 The procedure for termination for substantial breach of the Contract Documents shall be in accordance with the clause entitled "Termination for Default for Non-performance or Delay – Damages for Delay – Time Extensions" (Section 18 of General Conditions).

20. CORRECTION OF WORK.

20.1 The Contractor shall promptly remove from the premises all Work rejected by the Engineer/Architect for failure to comply with the Contract Documents, whether incorporated in the construction or not, and the Contractor shall promptly replace and re-execute the Work in accordance with the Contract Documents and without expense to the Unified Government and shall bear the expense of making good all Work of other Contractors or Subcontractors destroyed or damaged by such removal or replacement.

20.2 All removal and replacement Work shall be done at the Contractor's expense. If the Contractor does not take action to remove such rejected Work

within ten (10) days after receipt of Written Notice, the Unified Government may remove such Work and store the Materials, at the expense of the Contractor.

21. SUSPENSION OF WORK.

21.1 SUSPENSION FOR CONVENIENCE - The Procurement Officer may order the Contractor in writing to suspend, delay, or interrupt all or any part of the Work for such period of time as may be determined to be appropriate for the convenience of the Unified Government.

21.2 ADJUSTMENT OF COST - If the performance of all or any part of the Work is, for an unreasonable period of time, suspended, delayed or interrupted by an act of the Procurement Officer in the administration of these Contract Documents, or by the failure of the Procurement Officer to act within the time specified in these Contract Documents (or if no time is specified, within reasonable time), an adjustment shall be made for any increase in the cost of performance of these Contract Documents necessarily caused by such unreasonable suspension, delay, or interruption and the Contract Documents modified in writing accordingly. However, no adjustment shall be made under this clause for any suspension, delay or interruption to the extent:

- a. that performance would have been so suspended, delayed, or interrupted by any other cause, including the fault or negligence of the Contractor; or
- b. for which an adjustment is provided for or excluded under any other provision of these Contract Documents.

21.3 TIME RESTRICTION ON CLAIM - No claim under this clause shall be allowed:

- a. for any costs incurred more than 20 days before the Contractor shall have notified the Procurement Officer in writing of the act or failure to act involved (but this requirement shall not apply as to a claim resulting from a suspension order); and
- b. unless the claim is asserted in writing as soon as practicable after the termination of such suspension, delay, or interruption, but not later than the date of final payment under the Contract Documents.

21.4 ADJUSTMENTS OF PRICE - Any adjustment in Contract Price made pursuant to this clause shall be determined in accordance with the Price Adjustment Clause of These Contract Documents. (Section 14 of the General Conditions.)

22. CLAIMS BASED ON A PROCUREMENT OFFICER'S ACTIONS OR OMISSIONS.

22.1 NOTICE OF CLAIM - If any action or omission on the part of the Procurement Officer requiring a performance change within the scope of the Contract Documents constitutes the basis for a claim by the Contractor for additional compensation, damages, or an extension of time for completion, the Contractor shall continue with performance of the Work in compliance with the directions or orders of

such officials, but by so doing, the Contractor shall not be deemed to have prejudiced any claim for additional compensation, damages, or an extension of time for completion, provided:

a. The Contractor shall have given Written Notice to the Procurement Officer:

i. prior to the commencement of the Work involved, if at that time the Contractor knows of the occurrence of such action or omission;

ii. within 30 days after the Contractor knows of the occurrence of such action or omission, if the Contractor did not have such knowledge prior to the commencement of the Work; or

iii. within such further time as may be allowed by the Procurement Officer in writing.

b. The notice required by Subparagraph (22.1.a.) of this paragraph described as clearly as practicable at the time the reasons why the Contractor believes that additional compensation, damages, or an extension of time may be remedies to which the Contractor is entitled; and

c. The Contractor maintains, and upon request makes available to the Procurement Officer within a reasonable time, detailed records to the extent practicable, of the claimed additional costs or basis for an extension of time in connection with such changes.

22.2 LIMITATION OF CLAUSE - Nothing herein contained, however, shall excuse the Contractor from compliance with any rules of law precluding any Unified Government officers and any Contractors from acting in collusion or bad faith in issuing or performing Change Orders which are clearly not within the scope of the Contract Documents.

22.3 ADJUSTMENTS OF PRICE - Any adjustment in the Contract Price made pursuant to this clause shall be determined in accordance with the Price Adjustment clause of these Contract documents. (Section 14 of the General Conditions.)

23. TERMINATION FOR CONVENIENCE.

23.1 TERMINATION - The Unified Government may, when the interests of the Unified Government so require, terminate the Unified Government's obligations under these Contract Documents, in whole or in part, for the convenience of the Unified Government. The Procurement Officer shall give written notice of the termination to the Contractor specifying the part of the contract terminated and when termination becomes effective.

23.2 CONTRACTOR'S OBLIGATIONS - The Contractor shall incur no further obligations in connection with the terminated work and on the date set in the notice of termination the Contractor will stop Work to the extent specified. The Contractor shall also terminate outstanding orders and subcontracts as they relate to the terminated obligations. The

Contractor shall settle the liabilities and claims arising out of the termination of subcontracts and orders connected with the terminated obligations. The Procurement Officer may direct the Contractor to assign the Contractor's right, title, and interest under terminated orders or subcontracts to the Unified Government. The Contractor must still complete the obligation not terminated by the notice of termination and may incur obligations as necessary to do so.

23.3 RIGHT TO CONSTRUCTION AND SUPPLIES – The Procurement Officer may require the Contractor to transfer title and deliver to the Unified Government in the manner and to the extent directed by the Procurement Officer:

- a. any completed construction; and
- b. such partially completed construction, supplies, materials, parts, tools, dies, jigs, fixtures, plans, drawings, information, and contract rights (hereinafter called 'Construction Material') as the Contractor has specifically produced or specially acquired for the performance of the terminated obligation(s).

The Contractor shall protect and preserve property in the possession of the Contractor in which the Unified Government has an interest. If the Procurement Officer does not exercise this right, the Contractor shall use best efforts to sell such construction, supplies, and Construction Materials in accordance with the standards of K.S.A. 84-2-706. This in no way implies that the Unified Government has breached the Contract Documents by exercise of the Termination for Convenience Clause.

23.4 COMPENSATION

- a. The Contractor shall submit a termination claim specifying the amounts due because of the termination for convenience, together with cost or pricing data, submitted to the extent required by Section 3-303 (Cost or Pricing Data) of the Procurement Code, bearing on such claim. If the Contractor fails to file a termination claim within one year from the effective date of termination, the Procurement Officer may pay the Contractor, if at all, an amount set in accordance with Subparagraph I of this Paragraph.
- b. The Procurement Officer and the Contractor may agree to a settlement provided the Contractor has filed a termination claim supported by cost or pricing data submitted as required by Section 3-303 (Cost or Pricing Data) of the Procurement Code and that the settlement does not exceed the total Contract Price plus settlement costs reduced by payments previously made by the Unified Government, the proceeds of any sales of construction, supplies, and Construction Materials under Paragraph 23.3 of these General Conditions, and the Contract Price of the Work not terminated.
- c. Absent complete agreement under Subparagraph (b) of this Paragraph, the Procurement Officer shall pay the Contractor

the following amounts, provided payments under Subparagraph (b) shall not duplicate payments under this Paragraph:

- i. with respect to all contract Work performed prior to the effective date of the notice of termination, the total (without duplication of any items) of:

A. the cost of such Work plus a fair and reasonable profit on such portion of the Work (such profit shall not include anticipatory profit or consequential damages) less amounts paid or to be paid for completed portions of such Work; provided, however, that if it appears that the Contractor would have sustained a loss if the entire Work would have been completed, no profit shall be allowed or included and the amount of compensation shall be reduced to reflect the anticipated rate of loss;

B. costs of settling and paying claims arising out of the termination of subcontracts or orders pursuant to Paragraph 23.2 of these General Conditions. These costs must not include costs paid in accordance with Subparagraph (c.i.A) of this Paragraph;

C. the reasonable settlement costs of the Contractor including accounting, legal, clerical, and other expenses reasonably necessary for the preparation of settlement claims and supporting data with respect to the terminated obligation(s) and for the termination and settlement of subcontracts there-under, together with reasonable storage, transportation, and other costs incurred in connection with the protection or disposition of property allocable to the terminated obligations.

- ii. The total sum to be paid the Contractor under this Paragraph shall not exceed the total Contract Price plus the reasonable settlement costs of the Contractor reduced by the amount of any sales of construction, supplies, and Construction Materials under Paragraph 23.3 of these General Conditions, and the Contract Price of Work not terminated.

- d. Cost claimed, agreed to, or established under Subparagraphs (b) and (c) of this Paragraph shall be in accordance with Chapter 7 (Cost Principles) of the Procurement Regulations.

24. LIQUIDATED DAMAGES.

24.1 When the Contractor fails to complete the Work or any portion of the Work within the time or times fixed in the Contract Documents, the Contractor shall pay to the Unified Government the amount listed in the Agreement as Liquidated Damages for each calendar day of delay pursuant to the "Termination for Default for Non-performance or Delay – Damages for Delay – Time Extensions" clause. (Section 18 of the General Conditions.)

25. PAYMENTS FOR WORK PERFORMED IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

25.1 At least twenty (20) days before each progress payment falls due, the Contractor may submit, but not more than once a month, to the Engineer/Architect a partial payment estimate on a form suitable to the Engineer/Architect, filled out and signed by the Contractor covering the work performed during the period covered by the partial payment estimate and supported by such data as the Engineer/Architect may reasonably require. The Engineer/Architect will, within ten (10) days after receipt of each partial payment estimate, either indicate in writing his approval of payment and present the partial payment estimate to the Procurement Officer, or return the partial payment estimate to the Contractor indicating in writing his reasons for refusing to approve payment. In the latter case, the Contractor may make the necessary corrections and resubmit the partial payment estimate. The Unified Government will, within thirty (30) days of presentation to the Procurement Officer of an approved partial payment estimate, pay the Contractor a progress payment on the basis of the approved partial payment estimate. The Unified Government will retain five (5) percent of the amount of each payment until final completion and acceptance of all work covered by the Contract Documents. The Procurement Officer at any time, however, after fifty (50) percent of the work has been completed, if he finds that satisfactory progress is being made, may reduce retainage on the current and remaining estimates. When the work is substantially complete (operational or beneficial occupancy), the retained amount may be further reduced to only that amount necessary to assure completion.

25.2 Prior to Substantial Completion, the Unified Government, with the approval of the Engineer/Architect, may use any completed or substantially completed portions of the work. Such use shall not constitute an acceptance of such portions of the work.

25.3 Upon completion and acceptance of the work, the Engineer/Architect shall issue a certificate attached to the final payment request that the Work has been accepted by him under the conditions of the Contract Documents. The entire balance found to be due the Contractor, including the retained percentages, but except such sums as may be lawfully retained by the Unified Government, shall be paid to the Contractor within thirty (30) days of completion and acceptance of the work.

25.4 The Contractor will indemnify and save the

Unified Government and the Engineer/Architect, and their agents and employees harmless from all claims growing out of the lawful demands of Subcontractors, laborers, workmen, mechanics, materialmen, and furnishers of machinery and parts thereof, equipment, tools, and all supplies, incurred in the furtherance of the performance of the work. Prior to final payment and prior to any progress payment when so requested by the Unified Government, the Contractor shall furnish satisfactory evidence that all obligations of the nature designated above have been paid, discharged, or waived. If the Contractor fails to do so, the Unified Government may, after having notified the Contractor, either pay unpaid bills or withhold from the Contractor's unpaid compensation a sum of money deemed reasonably sufficient to pay any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged whereupon payment to the Contractor shall be resumed, in accordance with the terms of the Contract Documents, but in no event shall the provisions of this sentence be construed to impose any obligations upon the Unified Government to either the Contractor, his surety, or any third party. In paying any unpaid bills of the Contractor, any payment so made by the Unified Government shall be considered as a payment made under the Contract Documents by the Unified Government to the Contractor and the Unified Government shall not be liable to the Contractor for any such payments made in good faith.

26. ACCEPTANCE OF FINAL PAYMENT AS RELEASE.

26.1 The acceptance by the Contractor of final payment shall be made and shall operate as a release to the Unified Government of all claims and all liability to the Contractor, other than claims in stated amounts as may be specifically excepted by the Contractor, for all things done or furnished in connection with this Work and for every act and neglect of the Unified Government and others relating to or arising out of this Work. Any payment, however, final or otherwise, shall not release the Contractor or his sureties from any obligations under the Contract Documents or the Performance Bond and Payment Bonds.

27. INSURANCE.

27.1 The Contractor shall purchase and maintain during the term of this contract such insurance as will protect him and the Unified Government of Wyandotte County/Kansas City, Kansas, from claims set forth below which may arise out of or result from the Contractor's execution of the Work, whether such execution be by himself or by any Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable. The Unified Government of Wyandotte County/Kansas City, Kansas, shall be identified as an additional insured or provided with an owner's protective policy written on an occurrence basis on coverage set forth in Section 27.3 of this clause.

- a. Claims under workman's compensation disability benefit and other similar employee benefits;
- b. Claims for damages because of bodily

injury, occupational sickness or disease, or death of his employees;

c. Claims for damages because of bodily injury, sickness or disease, or death of any person other than his employees;

d. Claims for damages insured by usual personal injury liability coverage which are sustained (1) by any person as a result of an offense directly or indirectly related to the employment of such person by the Contractor, or (2) by any other person; and

e. Claims for damages because of injury to or destruction of tangible property, including loss of use resulting therefrom.

27.2 Certificates of insurance acceptable to the Unified Government shall be filed with the Unified Government within ten (10) days of the Notice of the Award. These Certificates shall contain a provision that states, "Should any of the above described policies be cancelled before the expiration date thereof, notice will be delivered in accordance with the policy provisions. At the discretion of the Unified Government, the Contractor shall file copies of endorsed insurance policies with the Unified Government prior to commencement of the Work.

27.3 The Contractor shall procure and maintain Contractor's General Public Liability and Property Damage Insurance, including vehicle coverage issued to the Contractor and protecting him and the Unified Government of Wyandotte County/Kansas City, Kansas, from all claims for personal injury, including death, and all claims for destruction of or damage to property, arising out of or in connection with any operations under the Contract Documents, whether such operations be by himself or by any Subcontractor under him. Insurance may be combined Bodily Injury and Property Damage Liability but in no event shall the limit of liability be less than \$500,000 for all damages arising out of bodily injury, including death, and all property damage sustained by any one person in any one accident, and \$500,000 aggregate for any such damage sustained by two or more persons in any one accident.

27.4 The Contractor shall acquire and maintain, if applicable, Fire and Extended Coverage Insurance upon the Project to the full insurable value thereof for the benefit of the Unified Government, the Contractor, and Subcontractors as their interest may appear. This provision shall in no way release the Contractor's surety from obligations under the Contract Documents to fully complete the Project.

27.5 The Contractor shall procure and maintain at his own expense, during the Contract Time, in accordance with the provisions of the law of the State of Kansas, Worker's Compensation Insurance, including occupational disease provisions, for all of his employees at the site of the Project and in case any Work is sublet, the Contractor shall require such Subcontractor similarly to provide Worker's Compensation Insurance, including occupational disease provisions for all of the latter's employees unless such employees are covered by the protection

afforded by the Contractor. In case any class of employees engaged in hazardous Work under these Contract Documents at the site of the Project is not protected under Worker's Compensation statute, the Contractor shall provide, and shall cause each Subcontractor to provide adequate and suitable insurance for the protection of his employees not otherwise protected.

27.6 The Contractor shall secure, if applicable, "All Risk" type Builder's Risk Insurance for Work to be performed. Unless specifically authorized by the Unified Government, the amount of such insurance shall not be less than the Contract price totaled in the Bid. The policy shall cover not less than the losses due to fire, explosion, hail, lightning, vandalism, malicious mischief, wind, collapse, riot, aircraft, and smoke during the Contract Time, and until the Work is accepted by the Owner. The policy shall name as the insured the Contractor and the Owner.

27.7 The Contractor, in addition to all other insurance requirements herein, shall procure and maintain insurance in the type and amount as may be required in any license, permit, or agreement obtained for the Project and which is necessary to complete the Work (i.e., Highway Permit, Railroad Crossing Agreement, Corps of Engineers Permit) regardless of who secured the license, permit or agreement.

28. CONTRACT SECURITY.

28.1 Where the contract is in excess of \$50,000.00, the Contractor shall furnish the Unified Government with a Performance Bond in the amount of 100% of the Contract Price. Where the contract is in excess of \$50,000.00, the Contractor shall furnish the Unified Government with a Labor and Material Payment Bond in the amount of 100% of the Contract Price. Bonds shall be delivered within ten (10) days of receipt of Notice of Award. The Performance Bond shall be conditioned upon the performance by the Contractor of all undertakings, covenants, terms, conditions, and agreement of the contract documents. The Payment Bond shall be conditioned upon the prompt payment by the Contractor to all persons supplying labor and Materials in the prosecution of the work provided by the Contract Documents and shall comply with the requirements of K.S.A. 60-1111 including, but not limited to the requirement that it be filed with the Clerk of the Wyandotte County District Court. All bonds shall contain all terms and conditions contained in the provided bond form in the Contract Documents and shall be executed by a surety company authorized to do business in the State of Kansas. Attorneys-in-fact who sign bonds must file with each bond a certified and effective dated copy of the power of attorney form.

28.2 The expense of these bonds shall be borne by the Contractor. If at any time a surety on any such Bond is declared bankrupt or loses its right to do business in the State of Kansas, the contractor shall within ten (10) days substitute an acceptable Bond (or Bonds) in such form and sum and signed by such other surety or sureties as may be satisfactory to the Unified Government. The premiums on such Bond shall be paid by the Contractor. No further payments shall be deemed due nor shall be made until the new surety or

sureties shall have furnished an acceptable bond to the Unified Government.

29. ASSIGNMENTS.

29.1 Neither the Contractor nor the Unified Government shall sell, transfer, assign or otherwise dispose of any rights or obligation created by the Contract Documents or any portion thereof, or of his right, title or interest therein or his obligations thereunder, without written consent of the other party.

30. INDEMNIFICATION.

30.1 The Contractor will indemnify and hold harmless the Unified Government and the Engineer/Architect and their agents and employees from and against all claims, damages, losses and expenses including attorney's fees arising out of or resulting from the performance of the Work, provided that any such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property including the loss of use resulting therefrom; and is caused in whole or in part by any negligent or willful act or omission of the Contractor, and Subcontractors, anyone directly or indirectly employed by any of them or anyone for whose acts any of them may be liable.

30.2 In any and all claims against the Unified Government and the Engineer/Architect, or their agents and employees, by any employee of the Contractor, any Subcontractor, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be liable, the indemnification obligation shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for the Contractor or any Subcontractor under Workmen's Compensation acts, disability benefit acts or other employee benefits acts.

30.3 The obligation of the Contractor under this paragraph shall not extend to the liability of the Engineer/Architect, his agents or employees arising out of the preparation or approval of maps, Drawings, opinions, reports, surveys, Change Orders, designs or Specifications.

30.4 The Contractor will be held strictly to the intent of the Contract Documents in regard to the quality of Materials, workmanship and execution of the Work. Inspections may be made at the factory or fabrication plant of the source of Material supply.

31. SEPARATE CONTRACTS AND RIGHT TO ENTER TO PERFORM WORK.

31.1 The Unified Government may perform additional Work related to the Project by itself, or it may execute other Contract Documents containing provisions similar to these. The Contractor shall afford the Unified Government and other Contractors reasonable opportunity for the introduction and storage of their Materials and the execution of their Work, and shall properly connect and coordinate his Work with theirs. If the proper execution or results of any part of the Contractor's Work depends upon the Work of the Unified Government or any other Contractor, the Contractor shall inspect and promptly report to the

Engineer/Architect any defects in such Work that render it unsuitable for such proper execution and results.

31.2 The Unified Government's right to perform work and enter other contracts shall not be construed as relieving the Contractor of the sole responsibility for the care and protection of the Work, or the restoration of any damaged Work except such as may be caused by agents or employees of the Unified Government or by other Contractors.

31.3 If the performance of additional Work by other Contractors or the Unified Government is not noted in the Contract Documents prior to the execution of the Contract Documents, written notice thereof shall be given to the Contractor prior to starting any such additional Work. If the Contractor believes that the performance of such additional Work by the Unified Government or other Contractors involves him in additional expense or entitles him to an extension of the Contract Time, he may make a claim therefor as provided in the Clause entitled "Changes" (Section 13 of the General Conditions).

32. SUBCONTRACTING.

32.1 The Contractor may utilize the services of specialty Subcontractors on those parts of the Work which, under normal contracting practices, are performed by specialty Subcontractors.

32.2 The Contractor shall not award subcontracts which total more than fifty (50) percent of the Contract Price, without prior written approval of the Unified Government.

32.3 Prior to the execution and delivery of the Contract Documents, the successful Bidder will submit to the Engineer/Architect for Unified Government's acceptance an updated list of the names of Subcontractors and Suppliers proposed for those portions of the Work and designating which Work each is to perform. For the purpose of reporting supplier participation, a reportable supplier is one who provides directly to the general contractor (first tier supplier). The general contractor is not required to report first tier supplier participation if the total purchases from the first tier supplier is less than \$2,500.00. The Affidavit of Intended Utilization has been provided to facilitate this requirement. Failure to submit this form may be interpreted as non-responsiveness and will be grounds for rejection of bids. Upon contract completion, any changes in the list of subcontractors or suppliers used or payment amount must be submitted to Purchasing before final payment will be made.

32.4 Twenty-five (25) days prior to initiation of Work by any Subcontractor and Suppliers the Contractor shall submit such subcontractor's name to the Engineer/Architect for the Unified Government's approval. Ten (10) days prior to initiation of Work by such Subcontractor or Supplier, the Engineer/Architect shall notify the successful Bidder in writing if either the Unified Government or Engineer/Architect, after due investigation, has reasonable objection to any Subcontractor or Supplier on such list. The failure of the Unified Government or the Engineer/Architect to

make objection to Subcontractor or Supplier shall constitute an acceptance of such Subcontractor or Supplier, but shall not constitute a waiver of any right of the Unified Government or the Engineer/Architect to reject defective Work, Material or Equipment, not in conformance with the requirements of the Contract Documents.

32.5 The Contractor will not make any substitution for any Subcontractor or Supplier who has been accepted by the Unified Government Engineer/Architect, unless the Engineer/Architect approves such a change in writing. The Contractor Utilization Plan may be used to facilitate this requirement. The failure of the Unified Government or the Engineer/Architect to make objection to Subcontractors or Suppliers shall constitute an acceptance of such Subcontractor or Supplier, but shall not constitute a waiver of any right of the Unified Government or the Engineer/Architect to reject defective Work, Material or Equipment, not in conformance with the requirements of the Contract Documents.

32.6 The Contractor shall be fully responsible to the Unified Government for the acts and omissions of his Subcontractors, and of persons either directly or indirectly employed by them, as he is for the acts and omissions of persons directly employed by him.

32.7 The Contractor shall cause appropriate provisions to be inserted in all subcontracts relative to the Work to bind Subcontractors to the Contractor by the terms of the Contract Documents insofar as applicable to the Work of Subcontractor and to give the Contractor the same power as regards terminating any subcontract that the Unified Government may exercise over the Contractor under any provisions of the Contract Documents.

32.8 Nothing contained in these Contract Documents shall create any contractual relationship between any Subcontractor and the Unified Government.

33. ENGINEER/ARCHITECT'S AUTHORITY.

33.1 The Engineer/Architect shall act as the Unified Government's representative during the construction period. He shall decide questions which may arise as to quality and acceptability of Materials furnished and Work performed. He shall interpret the intent of the Contract Documents in a fair and unbiased manner and shall not be held liable for the result of any interpretation or decision rendered in good faith.

33.2 The Engineer/Architect shall not and will not be responsible for the Contractor's construction means, controls, techniques, sequences, procedures, or safety. Except the Engineer/Architect may direct the sequencing, phasing and date of performance of the work and may change the location and quantities of the work as necessary to meet the objectives listed below. No additional payment shall be made for delays arising from changes to sequence, phasing or date of performance that could be reasonably anticipated from the nature, location and time of year of the work.

- a. To ensure the completion of priority elements of the project within the funds

available;

- b. To ensure the least practicable inconvenience to the public;
- c. To ensure the compliance with weather and seasonal limitations;
- d. To ensure the timely completion of field quality control testing and visual inspections;
- e. To ensure the coordination of work of other contractors, utilities or Unified Government crews in the best interest of the Unified Government.

33.3 The Engineer/Architect shall promptly make decisions relative to interpretation of the Contract Documents.

33.4 The Engineer/Architect may make visits to the site and determine if the Work is proceeding in accordance with the Contract Documents.

34. PROJECT REPRESENTATIVE.

The Engineer/Architect may provide one or more full time Project Representatives to assist the Engineer/Architect in carrying out his responsibilities at the site. The duties, responsibilities, and limitations of any such Project Representative shall be as follows:

34.1 Liaison

- a. Serve as the Engineer/Architect's liaison with the Contractor working principally through the Contractor's superintendent.
- b. Cooperate with the Contractor in his dealings with the various local agencies having jurisdiction over the Project in order to complete service connections to public utilities and facilities.
- c. Assist the Engineer/Architect in obtaining from the Unified Government additional details or information, when required at the job site for proper execution of the Work.

34.2 Review of Work

- a. Conduct on-site observations of the Work in progress for the Engineer/Architect as a basis for determining that the project is proceeding in accordance with the Contract Documents, and report to the Engineer/Architect whenever he believes that the Work should be stopped to insure that the completed Project will comply with the requirements of the Contract Documents.
- b. Verify that tests, including equipment and systems start up, which are required by the Contract Documents are conducted and that the Contractor maintains adequate records thereof; observe, record, and report to the Engineer/Architect appropriate details relative to the test procedures and start ups.
- c. Accompany visiting inspectors representing public or other agencies having jurisdiction over the Project, record the outcome of these inspections and report to the

Engineer/Architect.

34.3 Interpretation of Contract Documents

a. Transmit to the Contractor the Engineer/Architect's interpretations of the Contract Documents.

34.4 Records

a. Maintain at the job site orderly files for correspondence, reports of job conferences, shop drawings and other submissions, reproductions of original Contract Documents including all Addenda, Change Orders, and additional Drawings issued subsequent to the award of the contract, the Engineer/Architect's interpretations of the Contract Documents, progress reports, and other project related documents.

b. Keep a diary or log book, recording hours on the job site, weather conditions, list of visiting officials, daily activities, decisions, observations in general and specific observations in more detail as in the cases of observing test procedures.

c. Maintain a set of Drawings on which authorized changes are noted, and deliver to the Engineer/Architect at the completion of the project.

34.5 Guarantees, Certificates, Maintenance and Operation Manuals

a. During the course of the Work, assemble guarantees, certificates, maintenance operation manuals and other required data furnished by the Contractor and upon acceptance of the Project, deliver these documents to the Engineer/Architect for his review and forwarding to the Unified Government.

34.6 Completion

a. Prior to review for completion, submit to the Contractor a list of observed items requiring correction.

b. Conduct final review in the company of the Engineer/Architect and the Unified Government and prepare a final list of items to be corrected.

c. Verify that all items on final list have been corrected and make recommendations to the Engineer/Architect concerning acceptance.

34.7 Limitation of Authority – Except upon written instructions of the Engineer/Architect, the Project Representative:

a. Shall not authorize any deviation from the Contract Documents.

b. Shall not undertake any of the responsibilities of the Contractor, the Subcontractors or the Contractor's Superintendent.

c. Shall not expedite the Work for the Contractor.

d. Shall not advise on or issue directions

relative to any aspect of the means, methods, techniques, sequences or procedures of construction unless such is specifically called for in the Contract Documents.

e. Shall not authorize the Unified Government to occupy the Project in whole or in part.

35. LAND AND RIGHTS-OF-WAY.

35.1 Prior to issuance of Notice to Proceed, the Unified Government will have obtained all land and rights-of-way necessary for carrying out and for the completion of the Work to be performed pursuant to the Contract Documents, unless otherwise set forth in the Special Conditions or by Change Order.

35.2 The Unified Government shall provide to the Contractor written information which delineates and describes the land owned and rights-of-way acquired and any special requirements contained therein. (Shown on the drawings and/or in the Special Conditions.)

35.3 The Contractor shall provide at his own expense and without liability to the Unified Government any additional land and access thereto that the Contractor may desire for temporary construction facilities, for storage of Materials or for additional working area.

36. PERMITS AND LICENSES.

36.1 Permits and licenses of a temporary nature necessary for the prosecution of the Work shall be secured and paid for by the Contractor unless otherwise stated in the Special Conditions. The Contractor shall comply with all requirements, furnish required bonds, carry required insurance, pay all inspection fees and comply otherwise with all requirements of all permits and licenses regardless of whom obtained same. Copies of permits and licenses obtained by others, if not included in the Contract Documents, are available at the Engineer/Architect's office during regular business hours. The Contractor shall give all notices and comply with all laws, ordinances, rules and regulations bearing on the conduct of the Work as drawn and specified.

36.2 If the Contractor observes that the Contract Documents are at variance with other requirements, the Contractor shall promptly notify the Engineer/Architect in writing, and any necessary changes shall be adjusted in accordance with the Clause entitled "Changes" (Section 13 of the General Conditions).

37. GUARANTY.

37.1 The Contractor shall guarantee all Materials and Equipment furnished and Work performed. Furthermore, commencing on the Date the Unified Government accepts all Work, the Contractor also warrants and guarantees for a minimum of one year or such longer period as may be established for specific products or installations by the technical provisions that the accepted Work is free from all defects due to faulty Materials, Equipment or workmanship, and the Contractor shall promptly make corrections as may be necessary by reason of such defects and the repairs of any damage to other parts of the Work, including

damage to adjacent existing improvements, utilities, pavement and so forth, resulting from such defects. All Materials, Equipment or Work incorporated in correcting such defects shall also be warranted and guaranteed to conform with the Contract Documents for the applicable guarantee period in the Supplemental General Conditions.

37.2 The Unified Government will give Written Notice to the Contractor of observed defects with reasonable promptness. If for any reason the Contractor shall fail to make any such repairs, adjustments, including other Work that may be made necessary by such defects, within twenty (20) days after date such notice is served upon the Contractor, the Unified Government will have the right and authority to correct or cause the correction of the defects, including that which may be made necessary by said defects, and charge the Contractor for all costs thereby incurred. The Performance Bond shall remain in full force and effect through the guarantee period.

38. DISPUTES.

38.1 All controversies between the Unified Government and the Contractor which arise under, or are by virtue of these Contract Documents and which are not resolved by mutual agreement, shall be decided by the Procurement Officer in writing, within thirty (30) days after a written request by the Contractor for a final decision concerning the controversy; provided, however, that if the Procurement Officer does not issue a written decision within 30 days after written request for a final decision, or within such longer period as may be agreed upon by the parties, then the Contractor may proceed as if an adverse decision had been received.

38.2 The Procurement Officer shall immediately furnish a copy of the decision to the Contractor, by certified mail, return receipt requested, or by any other method that provides evidence of receipt.

38.3 Any such decision shall be final and conclusive, unless fraudulent, or the Contractor brings an action seeking judicial review of the decision in the Wyandotte County District Court.

38.4 The Contractor shall comply with any decision of the Procurement Officer and proceed diligently with performance of the Work pending final resolution by the Wyandotte County District Court of any controversy arising under, or by virtue of these Contract Documents, except where there has been a material breach of the Contract Documents by the Unified Government, provided, however, that in any event the Contractor shall proceed diligently with the performance of the Work where the Purchasing Director or head of a Purchasing Agency has made a written determination that continuation of Work under the Contract Documents is essential to the public health and safety.

39. TAXES.

39.1 Sales and compensating tax exemption certificate number will be provided by the Unified Government to the Contractor as set forth in K.S.A. 79-3606 (d) and (e), as may be amended.

39.2 If for any reason the exemption certificate number is not furnished the Contractor, the Unified Government will, upon Written Notice from the Contractor, execute a Change Order to compensate the Contractor for such sales and compensating taxes which would otherwise be legally exempted by said certificate number. (Section 13 of the General Conditions). Any adjustment in Contract Price made pursuant to this clause shall be determined in accordance with the Price Adjustment Clause of these Contract Documents (Section 14 of the General Conditions).

40. PROCESS AGENT.

40.1 If the Contractor is an individual, partnership or unincorporated association and if said Contractor is not a resident of the State of Kansas, said Contractor shall appoint in writing as such Contractor's agent, a resident of the County of Wyandotte, Kansas, as required by K.S.A. 16-113, as amended. Process for the Contractor may be served on such agent in any civil action which arises out of the Contract Documents. The appointment of such agent shall be filed with the Clerk of the District Court of Wyandotte County, Kansas. Any Contractor required hereunder to appoint such an agent shall not receive public moneys pursuant to the Contract Documents until the appointment has been made and filed.

41. SATURDAY, SUNDAY, HOLIDAY AND NIGHT WORK.

41.1 No Work shall be done on Saturday, Sunday, Unified Government designated holidays, or at night, without the written approval or permission of the Engineer/Architect in each case, except such Work as may be necessary for the proper care, maintenance and protection of Work already done or of Equipment and public property covered by the Contract Documents. Approval of the Engineer/Architect shall be sought at least forty-eight (48) hours in advance of such Work whenever practicable.

42. PUBLIC CONVENIENCE AND SAFETY.

42.1 The Contractor shall at all times so conduct his Work as to insure the least practicable obstruction to traffic. The convenience of the general public and the residents along the Project, and the protection of persons and property are of prime importance and shall be provided for by the Contractor in an adequate and satisfactory manner. When it is necessary for residents living along the Project to use a portion of road in the Project area, the Contractor shall maintain within the limits of these specifications, that portion of the road in a suitable condition for pedestrian and vehicular travel.

42.2 The Contractor shall be responsible for all traffic control devices necessary at the Project site, including installation, maintenance and removal of such devices. All traffic control devices supplied by the Contractor shall comply with the standards of the Manual on Uniform Traffic Control Devices, the most current edition, and the Traffic Control Devices Handbook and amendments thereto. The Contractor shall submit a written plan for traffic control during the Project to the Traffic Regulations Division of the

Public Works Department for approval prior to the commencement of the Project.

42.3 The Contractor shall contact the Traffic Regulations Division of the Public Works Department prior to any street closure or traffic restriction. The Contractor shall be responsible for notification of the police and fire departments in emergency traffic restriction situations.

43. PRE-CONSTRUCTION CONFERENCE.

43.1 Following execution of the Agreement between the Unified Government and the Contractor, but prior to the date established in the Notice to Proceed for commencement of the Work, a pre-construction conference shall be held at a date, time and place mutually acceptable to both parties to the Agreement unless otherwise waived by the Engineer/Architect. The conduct of the pre-construction conference is the responsibility of the Engineer/Architect and the prime purpose of the pre-construction conference will be to review the terms and conditions of the Contract Documents. Persons present at the pre-construction conference shall be determined by the Procurement Officer.

44. INTERRUPTION OF SERVICE.

44.1 When making preparations for making correction of the existing system or other work which will interrupt service to the utility users, the Contractor shall notify the affected users, stating the approximate time and duration of interruption of service. The Contractor shall notify the Unified Government authorities and the affected utility companies of any necessary interruption of service and shall limit such interruption to the duration mutually agreeable to all parties.

45. UTILITIES.

45.1 Location, size, material and depth shown on the drawing for existing utilities are based on information furnished by the utility companies from their records. Actual field locations have not been established by the Unified Government or Engineer/Architect. The Contractor shall investigate and verify plan locations and elevation of underground utilities in the field before commencing Work. Should it become necessary to temporarily move, shift, or relocate utility lines for the construction of this Project, the Work shall be arranged and paid for by the Contractor. Should it become necessary to permanently relocate utility lines to allow room for construction of said lines they shall be moved at no cost to the Contractor unless otherwise specified in the Special Conditions. The Contractor shall protect all railroad trackage, ties, ballast, utilities and structures encountered on or adjacent to the line of Work; damage to these facilities caused by the Contractor's Work shall be made good to the owner thereof by the Contractor without incurring any liabilities to the Unified Government or Engineer/Architect.

46. ADDITIONAL COPIES OF PLANS AND SPECIFICATIONS.

46.1 The Unified Government will furnish the Contractor up to 4 sets of Plans and Specifications

exclusive of those obtained for bidding. Additional sets will be furnished, upon request, at the cost of reproduction.

47. WORK ON RAILROAD AND HIGHWAY RIGHTS-OF-WAY.

47.1 Installation of casing pipe, pipelines and appurtenances along or across railroad and highway rights-of-way, shall be made in strict accordance with the instructions and regulations of the respective railroad company, the Kansas Department of Transportation and Kansas Turnpike Authority. The cost of railroad, Kansas Department of Transportation, or Kansas Turnpike Authority inspectors and flagmen shall be borne by the Contractor. Performance Bonds and special insurance coverage required by either or each the railroad, Kansas Department of Transportation, and Kansas Turnpike Authority shall be furnished by the Contractor at no additional cost to the Unified Government.

48. RECORDS.

48.1 The Contractor shall maintain one record copy of all Contract Documents at the site in good order and annotated to show all changes made during the Work, including the location, size and type of exposed improvements and the limits of incompressible soils (rock, shale, etc.). These records shall be available to the Engineer/Architect during progress of the Work and shall be delivered to the Engineer/Architect upon completion of the Project.

49. HISTORICAL OR ARCHAEOLOGICAL DEPOSITS.

49.1 If during the course of construction evidence of deposits of historical or archaeological interest is found, the Contractor shall cease operations affecting the find and shall notify the Unified Government who shall notify the Executive Director, Kansas Historical Society. No further disturbance of the deposits shall ensue until the Contractor has been notified by the Unified Government that he may proceed. The Unified Government will issue a Notice to Proceed only after the State official has surveyed the find and made a determination of value and effect and submitted such determination to the Unified Government. Compensation to the Contractor, if any, for lost time or changes in construction to avoid the find shall be determined in accordance with the Price Adjustment clause. (Section 14 of General Conditions.)

50. FORTY (40) HOUR WEEK PROVISION.

50.1 Laborers, workmen or mechanics in the employ of the Contractor, Subcontractors or other persons doing or contracting to do the whole or a part of the work contemplated and described in these contract documents shall be paid wages at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty (40) hours in any workweek. The basic rate of pay shall not be less than the prevailing rate per hour, as provided elsewhere in these general conditions. A violation of this condition shall be a violation of that section of the Code Ordinances of the Unified Government of Wyandotte

County/Kansas City, Kansas, that pertains to a forty (40) hour work week and shall be dealt with as provided for therein.

51. INTEREST PAYABLE ON CLAIMS.

51.1 Pursuant to Section 9-301 (Interest) of the Procurement Code, interest on amounts ultimately determined to be due to the Contractor shall be payable at the statutory rate applicable to judgments from the date the claim arose through the date of decisions or judgment, whichever is later.

52. MULTIPLE AWARDS.

52.1 The Unified Government reserves the right to make a multiple award in accordance with R-3-404.02 of the Procurement Regulations. Further, subsequent to award the Unified Government reserves the right to take separate bids if a particular quantity requirements arises which exceeds its normal requirement or amount specified in the Contract Documents, or if the Procurement Officer determines that quantities available under the Contract Documents will not meet a nonrecurring special need of the Unified Government. The Unified Government also reserves the right to procure internally.

53. INACCURATE PRICING DATA.

53.1 These Contract Documents may require submission by the Contractor of current cost or pricing data in accordance with Section 3-303 et. seq. of the Procurement Code. Such data will be required to be certified to by Contractor. Should the data certified by subsequently found to have been inaccurate, incomplete or noncurrent the Unified Government shall be entitled to an adjustment of the Contract Price, to exclude any significant sum by which the price was decreased because of the defective data. The price adjustment shall be done in accordance with R-3-303.06 of the Procurement Regulations.

54. PREVAILING WAGE RATE.

54.1 All construction projects in excess of \$15,000 shall be subject to the following provisions:

a. The Contractor and Subcontractors shall define the jobs of workmen, laborers and craftsmen engaged in construction activities on this project by classifications listed in the United States Department of Labor General Wage Decision for Wyandotte County, Kansas. The Contractor and Subcontractors shall pay employees performing work on the job site at a rate not less than the current prevailing per diem wage rate applicable to each job classification, except as modified in 54.1 (b).

b. Apprentices and trainees registered in training programs approved by the Department of Labor, may be paid less, but not less than seventy percent (70%) of the applicable rate. Training certificate must accompany the weekly payroll reports.

c. Contractor shall submit weekly reports evidencing compliance. Each report shall be submitted no more than seven (7) days after the pay date which it documents; the reports shall

be on a form approved by the Unified Government. No payments will be made unless weekly reports are current and approved by the Unified Government Construction Compliance Officer.

In addition to withholding payments for work previously performed, failure to submit weekly reports within the time period set forth in this contract document may result in the imposition of a fine pursuant to and as set forth in Ordinance No. 65739 and regulations adopted pursuant thereto. Information regarding fines may be provided at the preconstruction conference, is contained in applicable ordinances and regulations, and is available upon request.

d. Unified Government Construction Compliance Officer will be contacting and interviewing all employees on the job site to assure compliance.

54.2 The prevailing per diem wage rate is the required wages and fringe benefits on federal and federally assisted construction projects as determined by the United States Department of Labor in the General Wage Decision for Wyandotte County, Kansas which is current and effective ten days prior to the bid date. Bidders may rely on the wage decision or modification distributed at the pre-bid conference.

55. REMOVAL OF EMPLOYEES.

55.1 All Work under these Contract Documents shall be performed in a skillful and workmanlike manner. The Engineer/Architect may, in writing, require Contractor to remove from the Work any employee or supervisory personnel the Engineer/Architect deems incompetent or otherwise objectionable.

56. NONDISCRIMINATION IN EMPLOYMENT. PROVISIONS MANDATED BY LOCAL, STATE AND FEDERAL GOVERNMENTS.

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

56.1 The Contractor will not discriminate against any employee or applicant for employment because of race, religion, color, sex, disability, age, national origin, or ancestry. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, religion, color, sex, disability, age, national origin, or ancestry. Such action shall include, but not be limited, to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Unified Government setting forth the provisions of this non-discrimination clause.

56.2 The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard

to race, religion, color, sex, disability, age, national origin, or ancestry.

Condition.

56.3 The Contractor will cause the foregoing provisions to be inserted in all subcontracts for any work covered by this Agreement so that such provisions shall not apply to contracts or subcontracts for standard commercial supplies or raw materials.

56.4 The Contractor shall assure that it and all subcontractors will implement the certificate of compliance in connection with this Agreement.

56.5 If the Contractor shall fail, refuse or neglect to comply with the terms of these contractual conditions, such failure shall be deemed a total breach of the Agreement and such Agreement may be terminated, canceled or suspended, in whole or in part, and the Contractor may be declared ineligible for any further Unified Government contract for a period of up to one year. Provided, that if an Agreement is terminated, canceled or suspended for failure to comply with this section, the Contractor shall have no claims for damages against the Unified Government on account of such termination, cancellation or suspension or declaration of ineligibility.

56.6 The Contractor shall assure that it is in compliance with and shall maintain sufficient records to document that, under all aspects of this Agreement, it has acted in a manner which is in full compliance with all applicable sections of the Equal Employment section of this contract and the following, as applicable: Title VI of the Civil Rights Act of 1964 (as amended) (42 USCS § 2000d et seq.); Title VII of the Civil Rights Act of 1964 (42 USCS §§ 2000e et seq.); Title VIII of the Civil Rights Act of 1968 (42 USCS § 3601 et seq.); the Americans with Disabilities Act of 1990 (42 U.S.C. § 12101, and amendments thereto); the Kansas Act Against Discrimination (KSA § 44-1001 through 1004, 1992 Supp. And amendments thereto); Chapter 11 of the Procurement Code and Regulations of the Unified Government of Wyandotte County/Kansas City, Kansas, and amendments thereto; and §§ 18-86 and 87 of the 1988 Code of Ordinances of the Unified Government of Wyandotte County/Kansas City, Kansas, and amendments thereto. Such records shall at all times remain open to inspection by an individual designated by the Unified Government for such purpose.

56.7 The Contractor and the Unified Government, in carrying out this Agreement, shall also comply with all other applicable existing federal, state and local laws relative to equal opportunity and nondiscrimination, all of which are incorporated by reference and made part of this Agreement.

56.8 The Contractor will be required to conform to Equal Employment Opportunity and Affirmative Action requirements prior to the execution of this Agreement.

57. REVISIONS TO STANDARD GENERAL CONDITIONS.

57.1 Modifications to these General Conditions, if any, are made in the Supplemental Conditions. The Supplemental Conditions may contain additional conditions that are not modifications of a General

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UNIFIED GOVERNMENT OF WYANDOTTE COUNTY/KANSAS CITY, KANSAS
ENGINEERING DIVISION
SUPPLEMENTAL GENERAL CONDITIONS

These Supplemental General Conditions amend or supplement the General Conditions. All provisions which are not so amended or supplemented remain in full force and effect.

A. Pertaining to section 1, Definitions, of the General Conditions:

1. In section 1.9, CONTRACT DOCUMENTS, insert, “Standard Details, and Technical Specifications”, after, “Technical Provisions.”
2. In section 1.14, DRAWINGS, insert, “, including Standard Details”, after, “Engineer/Architect.”
3. In section 1.27, PROJECT REPRESENTATIVE, insert, “or RESIDENT PROJECT REPRESENTATIVE”, after, “PROJECT REPRESENTATIVE.”
4. In section 1.29, SPECIFICATIONS, insert, “and Technical Specifications”, after, “Special Conditions.”

B. Pertaining to section 1, Definitions, of the General Conditions: insert the following new paragraphs immediately after paragraph 1.40:

“1.41 STANDARD DETAILS – The part of the Contract Documents which show a common or repeated construction activity or practice required for the Project.

“1.42 TECHNICAL SPECIFICATIONS – A part of the Contract Documents consisting of written descriptions of a technical nature of materials equipment, construction systems, standards and workmanship required for the Project and which have been prepared and/or approved by the Engineer/Architect.”

C. Pertaining to section 3, Schedules, Reports and Records for Public Projects, of the General Conditions, insert the following new paragraph immediately after paragraph 3.3:

“3.4 The Contractor shall prepare a detailed weekly work schedule indicating the Work tasks and location(s) of work to be performed and the number of crews anticipated to be working on each of the Work tasks. Contractor shall submit the schedule to the Engineer electronically via email on the Thursday before the schedule is to take effect. The line number utilized on the Main Sewer and Manhole Rehabilitation Schedules may serve as the location(s) of the Work. The Work tasks shall include, at a minimum, pre-construction pipe televising, point repairs, CIPP-lining, non-excavation manhole rehabilitation, excavation-required manhole rehabilitation, manhole replacement, post-

construction pipe televising, required testing, and restoration.”

D. Pertaining to section 7, Inspection and Testing, of the General Conditions, replace “City” in the first sentence of Paragraph 7.2, a. with “Contractor.”

E. Pertaining to section 8, Substitutions, of the General Conditions: Replace section 8 of the General Conditions in its entirety with the following paragraphs:

“8. SUBSTITUTIONS

“8.1 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 and not to limit competition. 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 Engineer for review under the circumstances described below.

a. “Or-Equal” Items: If in Engineer’s sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Engineer as an “or-equal” item, in which case review and approval of the proposed item may, in Engineer’s sole discretion, be accomplished without compliance with some or all of the requirements for approval of proposed substitute items. For the purposes of this subparagraph 8.1.a., a proposed item of material or equipment will be considered functionally equal to an item so named if:

1. in the exercise of reasonable judgment Engineer determines that: (i) it is at least equal in quality, durability, appearance, strength, and design characteristics; (ii) it will reliably perform at least equally well the function imposed by the design concept of the completed Project as a functioning whole, and;
2. Contractor certifies that: (i) there is no increase in cost to the Owner; and (ii) it will conform substantially, even with deviations, to the detailed requirements of the item named in the Contract Documents.

b. Substitute Items

1. If in Engineer’s sole discretion an item of material or equipment proposed by Contractor does not qualify as an “or-equal” item under subparagraph 8.1.a., it will be considered a proposed substitute item.
2. Contractor shall submit sufficient information as provided below to allow Engineer to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefor. Requests for review of proposed substitute items of material or equipment will not be accepted by Engineer from anyone other than Contractor.

3. The procedure for review by Engineer will be as set forth in subparagraph 8.1.b.4. and as Engineer may decide is appropriate under the circumstances.
4. Contractor shall first make written application to Engineer for review of a proposed substitute item of material or equipment that Contractor seeks to furnish or use. The application shall certify that the proposed substitute item 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 use of the proposed substitute item will prejudice Contractor's achievement of Substantial Completion on time, whether or not use of the proposed substitute item in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for work on the Project) to adapt the design to the proposed substitute item and whether or not incorporation or use of the proposed substitute item in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute item from that specified will be identified in the application, and available engineering, sales, maintenance, repair, and replacement services will be indicated. The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from use of such substitute item, including costs of redesign and claims of other contractors affected by any resulting change, all of which will be considered by Engineer in evaluating the proposed substitute item. Engineer may require Contractor to furnish additional data about the proposed substitute item.

“8.2 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 approved by Engineer. Contractor shall submit sufficient information to allow Engineer, in Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The procedure for review by Engineer will be similar to that provided in subparagraph 8.1.b.

“8.3 Engineer's Evaluation: Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to paragraphs 8.1. and 8.2. Engineer will be the sole judge of acceptability. No “or-equal” or substitute will be ordered, installed or utilized until Engineer's review is complete, which will be evidenced by either a Change Order for a substitute or an approved Shop Drawing for an “or-equal”. Engineer will advise Contractor in writing of any negative determination.

“8.4 Special Guarantee: Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any substitute.

“8.5 Engineer’s Cost Reimbursement: Engineer will record time required by Engineer in evaluating substitute proposed or submitted by Contractor pursuant to paragraphs 8.1.b. and 8.2. and in making changes in the Contract Documents (or in the provisions of any other direct contract with Owner for work on the Project) occasioned thereby. Whether or not Engineer approves a substitute item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the charges of Engineer for evaluating each such proposed substitute.

“8.6 Contractor’s Expense: Contractor shall provide all data in support of any proposed substitute or “or-equal” at Contractor’s expense.”

F. Pertaining to section 14, Price Adjustment, of the General Conditions, replace “Section 3-303” in the first sentence of Paragraph 14.2 with “Section 29-200.”

G. Pertaining to section 25, Payments for Work Performed in Accordance with the Contract Documents, of the General Conditions, add the following new paragraphs immediately after paragraph 25.1:

“On a form suitable to the Engineer/Architect, the Contractor shall submit record Main Sewer and Manhole Rehabilitation Schedules in Microsoft Excel format with each partial payment estimate that indicates the installation date, actual quantities installed, and any deviation from planned quantities, for each pipe and manhole repair.

“During the progress of the Work, each application for payment shall be accompanied by Contractor’s compaction test results for sewer pipe installation.

“If payment is requested on the basis of materials and equipment not incorporated in 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, invoice, or other documentation warranting that Unified Government 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 or other arrangements to protect Unified Government’s interest therein, all of which must be satisfactory to the Unified Government. Payments for stored materials and equipment shall be based only upon the actual cost to Contractor of the materials and equipment and shall not include any overhead or profit to Contractor. Partial payments will not be made for undelivered materials or equipment.”

H. Pertaining to section 25, Payments for Work Performed in Accordance with the Contract Documents, of the General Conditions, add the following new paragraphs immediately after paragraph 25.2:

“a. “Substantial Completion” means that the facilities are completed to the point that wastewater can be conveyed to the satisfaction of ENGINEER. All piping

shall be installed and operational.

“b. To be considered substantially complete, the following portions of the Work must be operational and ready for OWNER's continuous use as intended, including all specified startup and testing procedures:

- i. All manholes/structures identified on the Drawings shall be installed / rehabilitated / replaced and tested.
- ii. All pipe and fittings identified on the Drawings shall be installed / rehabilitated / replaced and tested.
- iii. All active service connections shall be installed/reinstated.
- iv. All affected traffic signals are in normal operation. Street restoration does not need to be fully completed, however, temporary surfacing shall be provided such that streets are open and passable when active work is not being performed.
- v. All non-paved surfaces disturbed during construction shall be properly filled and graded and ready for final seeding or sodding and stabilized to prevent erosion.
- vi. Existing sanitary and storm sewer and manholes/structures shall be abandoned and/or removed as shown on the Drawings.

“c. Portions of the Work not essential to operation of the sewer, which can be completed without interruption of said system, may be completed after the Work is accepted as substantially complete, and may include the following items:

- i. Final restoration of pavement, sidewalks, curbs, and curb ramps
- ii. Seeding and sodding
- iii. Landscape work
- iv. Fencing
- v. Punch list items”

I. Pertaining to section 32, Subcontracting, of the General Conditions, replace “shall not” in Paragraph 32.2 with “may.”

J. Pertaining to section 36, Permits and Licenses, of the General Conditions, add the following new paragraph at the end of Paragraph 36.1:

“Fees for permits of a temporary nature necessary for the prosecution of the Work issued by the Unified Government will be waived by the Unified Government for this project.”

K. Pertaining to section 41, Saturday, Sunday, Holiday and Night Work, of the General Conditions, insert, “(between 7:00 pm and 7:00 am), or the dates from December 24 through January 2” in paragraph 41.1 after “or at night”.

- L. Pertaining to section 52, Multiple Awards, of the General Conditions, replace the first sentence of Paragraph 52.1 with the following:

“The Unified Government reserves the right to make multiple awards.”

- M. Pertaining to section 53, Inaccurate Pricing Data, of the General Conditions, replace “Section 3-303” in the first sentence of Paragraph 53.1 with “Section 29-200.”

- N. Pertaining to section 54, Prevailing Wage Rate, of the General Conditions, add the following new paragraph immediately after paragraph 54.2:

“In conformance with state law, HB No. 2069, prevailing wage rates are part of this solicitation and shall be incorporated into any resulting contract.”

- O. Pertaining to section 55, Removal of Employees, of the General Conditions, add the following new paragraphs immediately after paragraph 55.1:

“55.2 All workers directly involved in construction on site must have completed a ten-hour OSHA training course provided by an OSHA-authorized provider. Contractors and subcontractors are responsible for verifying that all construction personnel on site meet this requirement.

“55.3 Contractors and subcontractors must have a drug and alcohol abuse prevention policy designed to ensure that no person performing construction work does so under the influence of alcohol and drugs.”

**UNIFIED GOVERNMENT OF WYANDOTTE COUNTY/KANSAS CITY, KANSAS
ENGINEERING DIVISION
SPECIAL CONDITIONS**

These Special Conditions amend or supplement the Technical Provisions applicable to this specific project. All provisions which are not so amended or supplemented remain in full force and effect.

- A. Pertaining to section 1101, General Requirements for UG Administered Projects, of the Technical Provisions, add the following new paragraph at the end of Paragraph 1101.5:

“Unified Government permits that may be required for construction are: right-of-way use permit, haul permit, land disturbance permit, and street closure permit.”

- B. Pertaining to section 1101, General Requirements for UG Administered Projects, of the Technical Provisions, replace Paragraph 1101.6, F.2. in its entirety with the following paragraph:

“2. For projects lasting 45 days or less in a single location no sign is required.”

- C. Pertaining to section 1101, General Requirements for UG Administered Projects, of the Technical Provisions, add the following new paragraphs after Paragraph 1101.6, H.3.:

“4. Contractor shall obtain permission from the property owner prior to entering private property for the purpose of taking photographs.

“5. With prior approval of the Engineer, high quality video recording may be substituted for photographic records.”

- D. Pertaining to section 1101, General Requirements for UG Administered Projects, of the Technical Provisions, add the following new paragraph after Paragraph 1101.6, H.:

“I. Notice of Construction:

“Contractor shall send out a flyer for “Notice of Construction” at least 48 hours in advance to the start of the Work at each site. Flyers shall be posted on doorways of all residents and businesses within 200 feet of the proposed Work zone.”

- E. Pertaining to section 1102, Inspection of Land Development, of the Technical Provisions, delete Section 1102 in its entirety.

- F. Pertaining to section 2101, Excavation, Clearing, Grubbing, and Site Preparation, of the

Technical Provisions, replace section heading, “1101.3 Permits” with “2101.3 Permits.”

- G. Pertaining to section 2101, Excavation, Clearing, Grubbing, and Site Preparation, of the Technical Provisions, add the following new paragraph at the end of Paragraph 2101.3:

“Unified Government permits that may be required for construction are: right-of-way use permit, haul permit, land disturbance permit, and street closure permit.”

- H. Pertaining to section 2102, Grading, of the Technical Provisions, replace “two (2) years” with “three (3) years” in the second sentence of Paragraph 2102.4, N.

- I. Pertaining to section 2305, Maintenance of Traffic, of the Technical Provisions, insert the following sentence at the end of Paragraph 2305.3:

“Provide at least 24 hours notice to all affected property owners whenever driveway access will be disrupted. Notification may be made via door hanger notice or verbal communication at the Contractor’s discretion.”

- J. Pertaining to section 2401, Seeding, of the Technical Provisions, replace Paragraph 2401.2, M. in its entirety with the following paragraph:

“M. Planting Dates: 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.”

- K. Pertaining to section 2402, Sodding, of the Technical Provisions, replace Paragraph 2402.2, I. in its entirety with the following paragraph:

“I. Planting Dates: Bluegrass and Fescue sod may be planted during the periods of March 1 to May 15 and September 1 to November 15. Zoysia or Bermuda sod may be planted during the period of May 1 to October 15.”

- L. Pertaining to section 2502, Materials, of the Technical Provisions, delete paragraph 2502.2, B.6.a. in its entirety.

- M. Pertaining to section 2502, Materials, of the Technical Provisions, delete paragraph 2502.5, G.2. in its entirety.

- N. Pertaining to section 2505, Installation, of the Technical Provisions, replace Paragraph 2505.2, N. in its entirety with the following paragraph and sub-paragraphs:

“N. Connection of Pipes of Dissimilar Materials and of New Pipes to Existing Pipes: The connection of pipes of different materials and of new pipes to existing pipes shall be made using one of the following approved transition couplings that provide a permanent and watertight connection that will withstand the hydrostatic test pressure and prevent the offset of the joint within the coupling:

“1. Pipe Diameter 27-Inch and Smaller: Mission Flex Seal ARC Shielded Adjustable Sewer Repair Coupling, Fernco Strongback RC Coupling, Maxadaptor Coupling conforming to ASTM A240, C425, C1173, D5926, or approved equal.

“2. Pipe Diameter 30-Inch and Larger: Fernco Coupling encased with Class A reinforced concrete encasement, or approved equal. The encasement shall be minimum 24-inches in length and there shall be a maximum of ½-inch gap between pipe faces.”

O. Pertaining to section 2505, Installation, of the Technical Provisions, delete the second and third sentences in paragraph 2505.4, D.

P. Pertaining to section 2500, Sanitary Sewer, of the Technical Provisions, add the following new paragraphs at the end of Paragraph 2505.4:

“2505.5 Bypass Pumping

“Contractor shall provide bypass pumping for sewage flows as follows:

“A. Line segments scheduled for replacement (open cut excavation and pipe bursting/reaming), point repairs, and CIPP rehabilitation shall have all flows bypassed around them. The pumping system shall be sized for normal to peak flow conditions. Contractor shall maintain an operational backup pump on site. Direct discharge of flow to surrounding area drainage or separate storm sewer system is not allowed. Do not attempt flow diversion on combined sewers or storm sewers if rainfall is anticipated before the installation can be completed.

“B. The upstream manhole shall be monitored at all times, and an emergency deflate system shall be incorporated so that plugs may be removed at any time without requiring confined space entry. A plug shall be used to stop the sewage from reaching the line segment or manhole being lined or replaced. Remove plug at end of each working day and place relined, replaced, and existing sections and temporary or permanent service tie-ins back in service.”

Q. Pertaining to section 2507, Restoration, of the Technical Provisions, add the following paragraphs at the end of Paragraph 2507.10:

“A reasonable effort shall be made to save as many trees as possible. If trees can be saved by pruning, this shall be done in accordance with acceptable pruning practices. In the event the Contractor severely disturbs or damages the health and safety of any tree, as determined by the Engineer, the Contractor shall remove and replace the tree. If a tree is removed, it shall be replaced in a location coordinated with the property owner and outside of any permanent sewer easement. Replacement trees shall be 2-inch caliper (minimum) nursery stock trees.

“When excavation is required within the drip line of any tree, the Contractor shall take extra measures to protect as many roots as possible. All roots to be cut or removed shall be cut with a chain saw, trencher, or other methods that will leave a smooth cut surface. All roots exposed during excavation shall be protected to prevent the roots from drying out by covering the exposed area with canvas or burlap, peat moss, or mulch, and kept damp until the area has been backfilled.”

- R. Pertaining to section 2509, Manholes and Special Structures, of the Technical Provisions, replace Paragraph 2509.3, D.6. in its entirety with the following paragraph:

“Joints between precast manhole sections shall be sealed with preformed butyl joint sealants meeting the requirements of ASTM C990. The minimum butyl rubber content of the joint sealant shall be 50 percent butyl rubber, shall contain 2 percent or less volatile matter, and shall have a minimum bead dimension of $\frac{3}{4}$ to 1 square inch. The minimum amount of material for each joint is a function of the type of precast joint and shall be submitted for approval to the Engineer but in no case shall be less than a double bead. The sealant shall be placed at the elbow and top bearing surface of the section’s joint. The sealant shall be butt-joined and not lapped.”

- S. Pertaining to section 2509, Manholes and Special Structures, of the Technical Provisions, replace “twelve (12)” with “eight (8)” in the second sentence of Paragraph 2509.3, D.3.

- T. Pertaining to section 2509, Manholes and Special Structures, of the Technical Provisions, delete Paragraph 2509.3, D.9. in its entirety.

- U. Pertaining to section 2509, Manholes and Special Structures, of the Technical Provisions, replace Paragraph 2509.3, G.1.b. in its entirety with the following paragraph:

“b. All covers shall have two (2) concealed pickholes.”

- V. Pertaining to section 2509, Manholes and Special Structures, of the Technical Provisions, replace the second sentence of Paragraph 2509.6, K. in its entirety with the

following sentence:

“The joints shall be sealed with a double bead of preformed butyl joint sealant.”

- W. Pertaining to section 2509, Manholes and Special Structures, of the Technical Provisions, replace “bitumastic seals” in the first sentence of Paragraph 2509.6, L. with “butyl joint sealant.”
- X. Pertaining to section 2509, Manholes and Special Structures, of the Technical Provisions, delete section 2509.10 in its entirety.
- Y. Pertaining to section 2510, Cured-In-Place Pipe, of the Technical Provisions, delete section 2510 in its entirety.
- Z. Pertaining to section 2606, Cured-In-Place Pipe, of the Technical Provisions, delete section 2606 in its entirety.

FORMS

RELATIONS BETWEEN CONTRACTOR AND LABOR

The Contractor shall make a good faith effort to employ local labor within the Kansas City, Kansas Area insofar as it is available, for all work, except key positions. For purposes of this subparagraph, "local labor" is defined as resident of the Kansas City, Kansas Area for three (3) months next preceding the letting of this contract. "Key Position" is defined as superintendent, foreman, or timekeeper. If local labor is not available in sufficient quantities within the Kansas City, Kansas Area to prosecute and complete the work sufficiently, the Contractor may recruit labor from outside the area, only after he or she has satisfied the Engineer that a good faith attempt has been made to recruit local labor and only with the permission of the Engineer. It shall be understood that in the event of a reduction in labor force, preference will automatically be given to local residents of the Kansas City, Kansas Area.

COPELAND ANTI-KICKBACK ACT

The contractor and all subcontractors shall comply with the Copeland "Anti-Kickback" Act (18 U.S.C. 874) as supplemented in Department of Labor regulations (29 CFR, Part 3). This Act provides that each contractor or subgrantee shall be prohibited from inducing, by any means, any person employed in the construction, completion, or repair of public work, to give up any part of the compensation to which he is otherwise entitled.

Additional Requirements when MBE/WBE Goals are Established

Additional Requirements when MBE/WBE Goals are Established

When goals for MBE/WBE participation are established in the agreement, all the additional requirements, information, instructions and contract conditions in this section shall apply.

General.

Coordinator's authority. Coordinator shall mean the coordinator of the office of supplier opportunity. Subject to the appeals process included in the code, the coordinator shall make the final determination whether a bid meets the project goal or shows adequate good faith as set out in the Chapter 18 of the Code of the Unified Government of Wyandotte County/Kansas City, Kansas, Article V. SUPPLIER OPPORTUNITY

Commercially useful function. Only the work performed by a MBE or WBE providing a commercially useful function shall count toward meeting the utilization goal. Commercially useful function means real and actual services that are a distinct and verifiable element of the contracted work based upon private sector trade or industry standards. A MBE or WBE performs a commercially useful function when it is responsible for executing the ordinary and necessary work of the contract and is carrying out its responsibilities by actually performing, managing, and supervising the work involved. In determining commercially useful function the following guidelines will apply:

- MBE/WBE relationship to prime contractor: To count toward the project goal a MBE/WBE may be the prime contractor, part of a joint venture, a subcontractor, or a supplier.
- MBE/WBE qualification: To count toward the project goal a MBE/WBE must be certified in accordance with Sec. 18-158 of the Unified Government Supplier Diversity Ordinance.
- Materials: Expenditures for materials, supplies, and equipment obtained from a supplier who is a MBE/WBE shall count toward the project goal. Expenditures for materials, supplies, and equipment paid to MBE/WBEs that are not suppliers may count toward the utilization goal only to the extent they are fees or commissions charged for providing a bona fide service in the procurement of personnel, facilities, equipment, materials, or supplies required for performance of the work.

Instructions to Bidders.

Purpose of the goals. The purpose of the MBE/WBE goal is to secure bids from and negotiate price with eligible MBE and WBE subcontractors prior to submission of the bid.

Prior to Bid:

- Prior to the submission of the bid the bidder must select one of the *Means of Compliance with MBE and WBE Utilization Goals* listed in the supplemental general conditions of these additional requirements. If bidder selects the documentation of good faith effort as

the means of compliance, bidder shall execute and document the good faith efforts necessary for compliance prior to the bid opening.

- If the bidder is a joint venture with a MBE/WBE venturer to be counted toward the project goal, bidder must submit to the coordinator the joint venture agreement no later than close of business 3 calendar days prior to the bid opening.

Documentation Submitted with the Bid:

- Bidder must submit with the bid a completed and signed Affidavit of Intended Utilization on the form provided.
- If the utilization indicated on the Affidavit of Intended Utilization does not meet or exceed the utilization goals for the project, the bidder must also submit with the bid documentation of the good faith effort as indicated in the attached Good Faith Outreach Manual.

Documentation Submitted after bid prior to recommendation for award:

- Within 2 days of the bid the low bidder, and any other bidder who wishes to be considered in the event of the ineligibility of the low bidder, shall submit, on the forms provided, a completed, signed and notarized Contractor Utilization Plan and a completed, signed Letter of Intent to Subcontract from each MBE/WBE subcontractor listed in the Contractor Utilization Plan.

Evaluation of responsiveness:

- Failure to provide the documentation at the times required above is sufficient for a finding of non-responsiveness and a declaration of default of the bid, in which case the bid security shall become the property of the Unified Government. The Unified Government may waive irregularities and informalities in its determination of responsiveness.

Conditions of the Contract

When goals for MBE/WBE participation are established in the agreement, the following become general conditions of the contract.

Add GC 3.2.a to read as follows:

- 3.2.a Within five working days following commencement of work on a contract, the contractor shall submit to the coordinator of the office of supplier opportunity a duplicate of the project schedule that sets forth in detail the anticipated utilization of all MBEs and WBEs on the contract. In the event of a contract performance delay of more than one-third of the originally estimated length of time between project notice to proceed and completion, the contractor shall submit to the coordinator of the office of supplier opportunity not later than the originally estimated date of project completion, a revised schedule for utilization of all MBEs and WBEs on the contract.

Add GC 19.1.i.a to read as follows:

- 19.1.i If the Contractor fails to follow the Contractor Utilization Plan, except as provided for in General Condition 100 Race and Gender Conscious Remedies.

Add GC 25.1.a to read as follows:

- 25.1.a Contractor shall promptly render payment to all joint venturers, subcontractors and suppliers on a contract. Contractor shall provide with each pay request to the Unified Government, beginning with the second pay request, a partial claim releases from joint venturers, subcontractors and suppliers in form and content satisfactory to the Unified Government or shall provide, at the Unified Government's sole option, alternative proof of payment to subcontractors and suppliers in form and content approved by the coordinator of the office of supplier opportunity, evidencing that all joint venturers, subcontractors, and suppliers have been duly paid out of the proceeds of the contractor's payments from the Unified Government, unless a bona fide dispute, documented in writing, exists between the contractor and the unpaid joint venturer, subcontractor or supplier.

Add General Conditions 100 through 104 to read as follows:

100. Race and Gender Conscious Remedies. Except as provided below, the Contractor shall maintain, for the duration of the contract, the level of MBE and WBE participation identified in the Contractor Utilization Plan.
- a. Substitutions: Contractor shall not terminate, modify the work of, or otherwise fail to utilize a MBE or WBE that was originally listed in the Contractor Utilization Plan to satisfy the project goal without substituting another MBE or WBE performing the same commercially useful function and dollar amount, or demonstrating each element of modified good faith effort to substitute another MBE or WBE.
 - b. Changes in scope: Contractor shall immediately notify, in writing, the coordinator of the office of supplier opportunity of any agreed-upon increase or decrease in the scope of work of the contract.
 - i. An increased scope of work that cannot be performed by existing project subcontractors or by the contractor shall be subject to a utilization goal equal to the original utilization goal for the contract. The contractor shall satisfy such goal as respects the changed scope of work by soliciting new MBEs or WBEs in accordance with GC 101, or the contractor must show each element of modified good faith set out in GC 102.
 - ii. If the Unified Government decreases the scope of work affecting MBEs or WBEs performing on the contract the contractor, the evaluation of achievement of the utilization goal will be based on the intended utilization without the decrease in scope.
 - iii. If the change in scope results from adjustments to quantities in a unit price contract, the evaluation of achievement of the utilization goal will be based on the intended utilization without the decrease in scope, provided that the firm completing the work on the affected items is the firm originally identified in the Contractor Utilization Plan.

- c. Coordinator's authority. Subject to the appeals provisions of the contract, the coordinator of the office of supplier opportunity shall make the final determination of eligible costs and whether the utilization goal and/or good faith effort was achieved.
101. Means of compliance with MBE and WBE utilization goals: Contractor shall address the project goal established in the agreement through one or more of the following subsections:
- a. The Contractor is a MBE or WBE, the value of the commercially-useful function to be self-performed by the MBE or WBE shall count toward the project goal.
 - b. If the Contractor is a joint venture that includes one or more MBEs or WBEs, and the joint venture agreement was submitted prior to the date of the bid in accordance with the instructions to bidders, and the joint venture agreement was reviewed and approved by the coordinator of the office of supplier opportunity, then the value of the commercially useful function to be performed by the MBEs or WBEs in the joint venture shall count toward the project goal.
 - c. The Contractor utilizes MBEs or WBEs as subcontract, or suppliers, and the MBEs WBEs are identified in the Contractor Utilization Plan, and the plan was submitted as instructed in the instructions to bidders and the plan was reviewed and approved by the coordinator, then the value of the commercially useful function to be performed by such MBEs and WBEs shall count toward the project goal.
 - d. If the Contractor has not fully met the project goal by other means established above, but has demonstrated, during the evaluations of bids, that it has made good faith efforts to meet such goal, and that such demonstration has been reviewed and approved by the coordinator.
102. Modified good faith effort for MBE and WBE utilization: In the event of an increase in scope of work or in event of the termination or replacement of a MBE or WBE subcontractor or joint venturer, for which contractor is in unable to achieve the utilization goal due to failure to recruit additional MBEs or WBEs, the following modified good faith efforts must be completed. Failure to show good faith efforts in any of the following categories shall render its overall good faith efforts showing insufficient and its contract performance in non-compliant.
- a. Contractor shall notify, in writing, the coordinator of the office of supplier opportunity with respect to the contractor's intention to terminate or replace a MBE or WBE originally identified for participation in the bid or proposal upon which the contract was awarded. Contractor shall identify the reason for the termination or replacement and the type of work or services to be substituted.
 - b. Contractor shall use the most current directory from the Office of Supplier Opportunity to contact MBEs and WBEs that are eligible in the applicable area of work or supply at the time of the modified good faith effort.
 - c. Contractor shall provide documentation of the efforts to contact appropriate MBEs and WBEs within the same identified type of work. Copies of fax and e-mail, or a telephone call log will be acceptable.
 - d. Documentation of the modified good faith efforts must be submitted to the coordinator before the payment to the contractor of the next progress or other partial payment or fund release under the contract.

103. **Contract sanctions for failure to comply with Race and Gender conscious remedies to facilitate participation by minority and women business enterprises.** In the event that the coordinator of the office of supplier opportunity determines that a contractor has not complied with the Race and Gender conscious remedies contained in this contract, the coordinator may assess the contractor a civil, remedial penalty of not more than 150 percent of the contract amount that would have been allocated to one or more MBEs or WBEs but for the contractor's noncompliance. Any assessed civil penalties may be offset against any amount, including but not limited to contract retainage, otherwise due and owing to the contractor on the contract. In assessing a civil penalty the coordinator may reduce or waive all or part of the penalty in consideration of the following factors:
- a. The length of the period of noncompliance;
 - b. The contractor's history of previous noncompliance with any provision of the Unified Government's Supplier Opportunity code,
 - c. The monetary impact of the civil penalty on the contractor in correcting the noncompliance; or
 - d. Other facts and circumstances relevant to the noncompliance of the contractor.
104. **Burden of Proof.** Whenever the Coordinator of the office of supplier opportunity conducts an investigation of compliance with these provisions, the Contractor shall cooperate fully with the investigation, and shall provide complete, truthful information to the coordinator, and shall bear the burden of proving compliance with the Unified Government's race and gender conscious remedies.

UNIFIED GOVERNMENT GOOD FAITH OUTREACH MANUAL



UNIFIED GOVERNMENT GOOD FAITH OUTREACH PROGRAM

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I. Program Summary

The Good Faith Outreach Program is a component of the Unified Government Supplier Diversity Program and applies to City-funded construction contracts in excess of \$250,000. When Federal or State funding sources impose additional requirements, those requirements as defined in the contract documents replace the requirements of this program.

The Unified Government is committed to maximizing subcontracting opportunities for certified M/WBE firms. Bidders should be fully informed of Good Faith Outreach Program as set forth in this document.

This program is subject to policies and requirements established by the Unified Government Supplier Diversity Program. Bidders are advised to be fully informed of the requirements set forth in this document. Failure to comply with the City's Supplier Diversity Program may cause a bid to be rejected as non-responsive.

Terms and conditions of the Good Faith Outreach Program apply to City-funded construction projects in excess of \$250,000. At the City's sole discretion, these requirements may be waived in advance on projects deemed inappropriate for subcontracting participation. When State and/or Federal funding sources require affirmative action goals, those goals as defined in the contract documents replace requirements of the Supplier Diversity Program.

II. GOOD FAITH OUTREACH OVERVIEW

This program requires bidders to make subcontracting opportunities available to a broad base of qualified subcontractors and to achieve a minimum level of M/WBE subcontractor participation as identified for eligible projects. To be eligible for award, the apparent low bidder must meet or exceed the M/WBE project goals or submit documentation of their good faith outreach efforts within two (2) working days following the close of business on the day bids are opened. Should it become necessary to evaluate the efforts of bidders beyond the apparent low bidder, each additional firm shall receive five (5) working days for submittal of documentation commencing on the date of notification. Notification can be verbal or in writing. Failure to submit required documentation within this time frame will cause a bid to be rejected as non-responsive.

For assistance or further information about the *Good Faith Outreach Program*, contact the Supplier Diversity Program Manager at 913-573-5439.

III. Definitions

- A. Bidder means a business enterprise that submits a bid on a construction contract that is offered for competitive bidding by the Unified Government.
- B. Good Faith Outreach Efforts: Affirmative steps taken by a bidder prior to bid opening to ensure maximum effort to recruit subcontractors, including Minority Business Enterprises (MBEs) and Woman Owned Enterprises (WBEs), as sources of supplies, construction and other services whenever possible. Required steps for documenting outreach efforts are outlined in Paragraph V of this document.
- C. Minority business enterprise or MBE means a business enterprise that is owned and controlled by one or more minority individuals and that is certified as a minority business enterprise by one of the entities set forth in section 18-158(a)(1) of the Unified Government Code of Ordinances.

- D. Subcontract: Agreement between a prime contractor and an individual, firm or corporation for performance of particular portion(s) of work for which prime contractor has obligated itself.
- E. Subcontractor: An individual, firm or corporation having a direct contract with prime contractor for performance of portion(s) of work to be constructed under the contract, including furnishing of labor, materials or equipment.
- F. Woman business enterprise or WBE means a business enterprise that is owned and controlled by one or more women who are citizens or lawful permanent residents of the United States and that is certified as a woman business enterprise by one of the entities set forth in section 18-158(a)(1) of the Unified Government Code of Ordinances.

IV. Good Faith Outreach Indicators

Documentation of a bidder's outreach efforts will be reviewed by Unified Government according to the indicators listed below to verify that bidder made subcontracting opportunities available to a broad base of qualified subcontractors, negotiated in good faith with interested subcontractors, and did not reject any bid for unlawful discriminatory reasons.

Failure to submit Good Faith Efforts will render a bid non-responsive and will result in its rejection. Indicators are judged on a pass/fail basis, i.e., either full or zero credit can be achieved for compliance with each item as set forth below:

	Good Faith Outreach Indicator
1.	Attended pre-bid meetings scheduled by the Unified Government
2.	Contacted and followed up with eligible M/WBE business in the applicable trades that were known to the contractor, or available on State, County, or other maintained lists, to submit a quote at least 10 days before the bid date and notified them of the nature and scope of the work to be performed
3.	Made construction plans, specifications and requirements available for review by prospective M/WBE businesses, or provided these documents to them at least 10 days before the bids are due
4.	Initiated and documented correspondences with M/WBE trade, community, or contractor organizations that provide assistance in recruiting M/WBE subcontractors or suppliers
5.	Broken down or combined elements of work into economically feasible units to further facilitate M/WBE participation
6.	Advised M/WBE subcontractors and suppliers in obtaining bonds, lines of credit or insurance
7.	Negotiated in good faith with interested M/WBE subcontractors/suppliers and did not reject them as unqualified without sound reasons based on their capabilities
8.	Placed ads soliciting M/WBE subcontractors/suppliers in a publication targeting M/WBE subcontractors/suppliers not less than 10 days prior to bid

V. Documentation of Good Faith Outreach Efforts

1.	Attended pre-bid meetings scheduled by the Unified Government

Bidder attended pre-bid meeting scheduled by the City to inform all bidders of requirements for subject project. A sign in sheet will be distributed at all pre-bid meetings. It is the bidder's responsibility to sign in on the list.

Required documentation: The project manager will have record of the pre-bid sign in sheet..

2.	Contacted and followed up with eligible M/WBE subcontractors and suppliers certified in the applicable trades

Bidder contacted certified M/WBE business in the trades present on the project. The M/WBE businesses must be certified in the trade for which they are being asked to submit quotes on..

Required documentation: A completed call log, copies of emails/faxes, certified mail receipts or any other documents illustrating communications to M/WBE businesses. These documents must show evidence of receipt by the M/WBE subcontractor/supplier.

3.	Made the construction plans, specifications, and requirements available for review by prospective M/WBE subcontractors and suppliers

Bidder provided interested M/WBE subcontractors and suppliers with access to plans, specifications and requirements for subject project.

Required documentation: Contents of advertisements or written notices to subcontractors should demonstrate compliance with this indicator.

4.	Initiated and documented correspondences with M/WBE trade, community or business organizations

Not less than ten (10) calendar days prior to bid submittal, bidder requested assistance from agencies which recruit and place M/WBE subcontractors or suppliers. A list of such agencies is available from the Unified Government. Other organizations which promote M/WBE subcontractor or supplier activities may also be contacted.

Required documentation: Submit copy of each fax, letter, or email sent to outreach agencies requesting assistance in recruiting subcontractors. Faxed copies must include fax transmittal confirmation slip showing date and time of transmission. Mailed letters must include copies of metered envelopes or certified mail receipts. All communications must include the Unified Government project name, name of bidder, and contact person's name and phone number.

5.	Broken down or combined elements of work to further facilitate M/WBE participation

Bidder must demonstrate that reasonable efforts were taken to subdivide portions of work to increase opportunities for M/WBE participation.

Required documentation: Documented communications between prime and subcontractors or suppliers demonstrating that individual scopes of work were modified to facilitate M/WBE participation

6.	Advised M/WBE subcontractors and suppliers in obtaining bonds, lines of credit or insurance

Bidder made efforts to advise and assist interested subcontractors in obtaining bonds, credit lines and insurance required for subject project.

Required documentation: Contents of advertisements (Indicator 8) or written notices to subcontractors (Indicator 2) will determine compliance with this objective.

7.	Negotiated in good faith with interested M/WBE subcontractors and suppliers.

Bidder acted in good faith with interested subcontractors and has rejected no bid other than for legitimate business reasons.

Required documentation: Submit: a) Copies of all subcontractor bids or quotes received; and b) Summary sheet organized by work type listing subcontractor company names with bid amounts for each work type. Identify selected subcontractor for each work type. If bidder elects to use own forces to perform a work type, include bid to show own costs for the work. Copies of bids or quotes from subcontractors and suppliers must also be included if those bids are used toward achievement of the M/WBE utilization goal and the business must also be listed on the Contractor Utilization Plan.

8.	Placed ads soliciting subcontractors/suppliers in a publication targeting M/WBE subcontractors/suppliers not less than 10 days prior to bid

Not less than ten (10) calendar days prior to bid submittal, bidder conducted an advertising campaign designed to reach all segments of the Kansas City metropolitan business community by advertising in either newspapers, trade association publications, special interest publications, trade journals, community papers or other media. Advertisement must be specific to the project, not generic, and may not be a plan holder advertisement provided by the publication. Advertisement must be worded to ensure it does not exclude or limit number of potential respondents and must include:

- Unified Government project name and number;
- Name of bidder;
- Areas of work available for subcontracting;
- Contact person's name and phone number;
- Information on availability of plans and specifications;
- Bidder's policy concerning assistance to subcontractors in obtaining bonds and credit lines and/or insurance

Required documentation: Submit copies of advertisements and proof of publication dates.

Affidavit of Intended Utilization

Processing Instructions: Submit this form with your Price Proposal. MBE/WBE Goals must be met or evidence of Good Faith Efforts must be submitted with Price Proposal. Use additional forms as necessary to list all MBE/WBEs proposed.

Offeror known as _____ hereby states his intent that on the _____ project, Project # _____, Offeror intends to use the following subcontractors and suppliers to achieve the M/WBE goals established for this project:

Firm Name:	Address:	
Contact:	Phone:	Fax:
Trade:	LBE ☐ MBE ☐ WBE ☐	Certification Agency:
Total value of subcontract, in dollars:\$ _____, as %:		

Firm Name:	Address:	
Contact:	Phone:	Fax:
Trade:	LBE ☐ MBE ☐ WBE ☐	Certification Agency:
Total value of subcontract, in dollars:\$ _____, as %:		

Firm Name:	Address:	
Contact:	Phone:	Fax:
Trade:	LBE ☐ MBE ☐ WBE ☐	Certification Agency:
Total value of subcontract, in dollars:\$ _____, as %:		

Firm Name:	Address:	
Contact:	Phone:	Fax:
Trade:	LBE ☐ MBE ☐ WBE ☐	Certification Agency:
Total value of subcontract, in dollars:\$ _____, as %:		

Firm Name:	Address:	
Contact:	Phone:	Fax:
Trade:	LBE ☐ MBE ☐ WBE ☐	Certification Agency:
Total value of subcontract, in dollars:\$ _____, as %:		

Project Goals: MBE% 0 WBE% 0 Combined% 0

Intended Utilization: MBE% _____ WBE% _____

The M/WBE goals established for this project will ☐ or will not ☐ be met by the participation shown in this affidavit.

Submitted By: _____

Date: _____

Contractor Utilization Plan

Processing Instructions: This form is due within 2 days of bid opening or proposal due date. MBE/WBE Goals must be met or evidence of Good Faith Efforts must be submitted with bid. Use additional forms as necessary to list all MBE/WBEs proposed.

Offeror known as _____ hereby states his intent that on the _____ project, Project # _____, Offeror intends to use the following subcontractors and suppliers to achieve the M/WBE goals established for this project:

Firm Name:	Address:	
Contact:	Phone:	Fax:
Trade:	LBE ☐ MBE ☐ WBE ☐	Certification Agency:
Total value of subcontract, in dollars:\$ _____, as %:		

Firm Name:	Address:	
Contact:	Phone:	Fax:
Trade:	LBE ☐ MBE ☐ WBE ☐	Certification Agency:
Total value of subcontract, in dollars:\$ _____, as %:		

Firm Name:	Address:	
Contact:	Phone:	Fax:
Trade:	LBE ☐ MBE ☐ WBE ☐	Certification Agency:
Total value of subcontract, in dollars:\$ _____, as %:		

Firm Name:	Address:	
Contact:	Phone:	Fax:
Trade:	LBE ☐ MBE ☐ WBE ☐	Certification Agency:
Total value of subcontract, in dollars:\$ _____, as %:		

Project Goals: MBE% _____ WBE% _____

Intended Utilization: MBE% _____ WBE% _____

The M/WBE goals established for this project will ☐ or will not ☐ be met by the participation shown in this affidavit.

Submitted By: _____

Date: _____

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

My Commission Expires _____

Notary Public

Letter of Intent to Subcontract

Processing Instructions: This form is due within 2 days of bid opening or proposal due date. A Letter of Intent to Subcontract must be submitted for each M/WBE subcontractor listed on the Contractor Utilization Plan. MBE/WBE Goals must be met or evidence of Good Faith Efforts must be submitted with bid.

Offeror known as _____ hereby states his intent that on the
Prime Contractor
_____ project, Project # _____, Offeror intends to
enter a contractual agreement with _____, who will
M/WBE Subcontractor

provide the following goods / services in connection with the above referenced project:

Scope of Work: _____

Total value of subcontract: \$ _____

Percentage of total contract: % _____

Subcontractor:

I intend to work on the above named project, perform the indicated scope of work, and receive the indicated compensation contingent upon award of the contract to the aforementioned Prime Contractor.

Signature: Sub Contractor

Print Name

Title Date

Prime Contractor:

I intend to utilize the above named M/WBE subcontractor on the referenced project for the scope of work indicated contingent upon award of the contract to my firm.

Signature: Prime Contractor

Print Name

Title Date

Core4 Tax Clearance Process & Contact List

Tax Clearance Process: The vendor must sign the attached forms RD-C3 form for the City of Kansas City, Missouri and the Multi-Jurisdictional Core 4 Property Tax Clearance Certification and e-mail or fax to the numbers listed below. The vendor should receive a letter or notice from the City of Kansas City, Missouri Revenue Department that certifies that their taxes are current. (Sample letter attached) Next the vendor should fill out the attached Multi-Jurisdictional Core 4 form and e-mail or fax to Jackson County, Johnson County and the Unified Government of Wyandotte County/Kansas City, Kansas. The vendor should receive three (3) responses from those entities that they are tax compliant. Those responses along with the letter from Kansas City, Missouri must be presented to the Unified Government Department of Procurement and Contract Compliance PRIOR to the Unified Government of Wyandotte County/Kansas City, Kansas issuing a Notice to Proceed to the successful vendor.



Jackson County, MO

Primary: Barbara Casamento, Purchasing Manager, Jackson County
bcasamento@jacksongov.org 816-881-3253



Johnson County, KS

Primary: Greg Baldwin, Deputy Treasurer, Johnson County, KS
taxinfo@jocogov.org 913-715-2609

Back Up: TFM-TreasuryServices@jocogov.org



Unified Government of Wyandotte County

Primary: Sharon Reed, Procurement Manager, UG
sreed@wycokck.org, 913-573-5465



Kansas City, MO

Primary: Cassy Midgyett, Interim Administrator Supervisor, Kansas City, MO
cassy.midgyett@kcmo.org 816-513-4929

Back Up: Eric Davison, Financial Manager of Operations, Kansas City, MO
Eric.davison@kcmo.org 816-513-4927

MULTI-JURISDICTION- CORE4
PROPERTY TAX CLEARANCE CERTIFICATION

(Jackson County, MO, Unified Government of Wyandotte County, KS & Johnson County, KS)

Business to Be Certified:

1. Business Name: _____
DBA Name: _____

2. Business Address: _____
Street City, State Zip

3. Contact Information: _____
Phone E-mail

Business Owner/Taxpayer To Be Certified (Attach additional sheets if more owners exist for your business.)

Owner Name: _____

Owner Residence Address: _____
Street City, State Zip

Authorization/Signature

This Authorization shall expire one (1) year from the latest date below certified and is renewed upon agency request.

I, the undersigned Business Owner/Taxpayer, hereby hold each CORE4 entity named below harmless from any and all liability relating to unauthorized disclosure of confidential tax information resulting from release of information related to this Core4 Tax Clearance Authorization 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.

Further, I hereby certify that I am the Owner/Taxpayer named herein or that I have the authority to execute this Authorization on behalf of the Owner/Taxpayer hereinabove named.

Owner/Taxpayer

CORE4 CERTIFICATION

I, the undersigned CORE4 representative, do hereby certify that property taxes levied for the preceding year against the owner/taxpayer shown above have either been paid in full, have been paid for the first half of the preceding year or that satisfactory evidence has been presented to this office that said owner/taxpayer had no taxable property for the preceding year. I further certify that property taxes levied for the preceding year against owner/taxpayer shown above have also been paid in full; have been paid for the first half of the preceding year or that satisfactory evidence has been presented to this office that said owner/taxpayer had no taxable property for the preceding year;

OR

Tax Clearance Not Granted ☐ Entity _____

Tax Clearance Not Granted ☐ Entity _____

Tax Clearance Not Granted ☐ Entity _____

JACKSON COUNTY, Missouri on this date: _____, by _____
Purchasing Agent/Mgr/ County Designee

UNIFIED GOVERNMENT/ KC, KS on this date: _____, by _____
Contract Compliance Officer/Designee

JOHNSON COUNTY, KS on this date: _____, by _____
County Treasurer/Designee

City of Kansas City, Missouri - Revenue Division
CLEARANCE REQUEST FORM



Phone: (816) 513-1135

Fax: (816) 513-1264

E-file: www.kcmo.org/revenue

Federal ID (FEIN)		
Name (Business Name and DBA)		
Address (include City, State & Zip)		
☐ Check this box if you wish to receive this letter by fax	Fax Number	
Request Submitted By (Print Name)	Title (If Applicable)	
Signature	Phone Number	Date

PLEASE ALLOW SEVEN (7) BUSINESS DAYS FOR PROCESSING

PLEASE SEND COMPLETED FORM(S) TO:

Kansas City's Business Customer Service
Center 1118 Oak St.
Kansas City, MO 64106



Finance Department

Revenue Division

1118 Oak Street
Kansas City, MO 64106-2786

Phones (816) 513 1135
Fax1 (816) 513 1264
Email1 revenue@kcmo.org
kcmo.gov/revenue

Letter Id1 1.222222222
Date1 09-Jan•2015
Taxpayer Id1 ...*** J204

Tree Trimming LLC
123 Anywhere
KANSAS CITY MO 64134 1916

11•111111111111111111•11P•111111111111111111•111111111111111111

This notice certifies that **Tree Trimming LLC** is current as of this date with all taxes and licenses under the jurisdiction of the City of Kansas City, Mo., Finance Department/Revenue Division.

This is a **SAMPLE** Tax Clearance Letter

Mr. Fred Jones
Commissioner of Revenue

IMPORTANT INFORMATION:

Due to the confidential nature of tax information, this notice is provided directly to the taxpayer.

Visit kcmo.gov/quicktax to view the status of your account and for online filing

KDHE SRF CONTRACT PROVISIONS

KDHE SRF Forms and Certifications (Must be submitted with Bids)

STATE OF KANSAS
ACT AGAINST DISCRIMINATION
CONTRACT PROVISION CERTIFICATION FORM

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

- (1) The contractor shall observe the provisions of the Kansas Act Against Discrimination and shall not discriminate against any person in the performance of work under the present contract because of race, religion, color, sex, disability, national origin, or ancestry;
- (2) In all solicitations or advertisements for employees, the contractor shall include the phrase "equal opportunity employer" or a similar phrase to be approved by the Commission;
- (3) If the contractor fails to comply with the manner in which the contractor reports to the Commission in accordance with the provisions of K.S.A.44-1031 and amendments thereto, the contractor shall be deemed to have breached the present contract and it may be cancelled, terminated, or suspended, in whole or in part, by the contracting agency;
- (4) If the contractor is found guilty of a violation of the Kansas Act Against Discrimination under a decision or order of the Commission which has become final, the contractor shall be deemed to have breached the present contract and it may be cancelled, terminated or suspended, in whole, or in part, by the contracting agency;
- (5) The contractor shall include the provisions of (1) through (4) in every applicable subcontract or purchase order so that such provisions will be binding upon such subcontractor or vendor.

PROJECT/CONTRACT NAME AND NO.

MUNICIPALITY _____

CONTRACTOR'S
SIGNATURE _____

TITLE _____

SRF PROJECT NO. _____

DATE _____

Demonstration of Compliance with DBE Good Faith Efforts Worksheet

Project Name _____

SRF Project No. _____

Prime Contract Bidder/Engineering Firm _____

Address _____

Contact Person: _____ Telephone No. _____

The following DBE firms were made aware of subcontracting/supplier opportunities related to the project listed above.

DBE Subcontractor/Supplier contacted _____

Address _____

Contact Person: _____ Telephone No. _____

Email _____ Method used to contact (circle one): Phone M a i l Fax

Is entity also a certified as a MBE _____ or WBE _____? (if no leave blank)

MBE/WBE status certified by (circle one) EPA SBA Other _____

DBE Subcontractor/Supplier contacted _____

Address _____

Contact Person: _____ Telephone No. _____

Email _____ Method used to contact (circle one): Phone M a i l Fax

Is entity also a certified as a MBE _____ or WBE _____? (if no leave blank)

MBE/WBE status certified by (circle one) EPA SBA Other _____

DBE Subcontractor/Supplier contacted _____

Address _____

Contact Person: _____ Telephone No. _____

Email _____ Method used to contact (circle one): Phone M a i l Fax

Is entity also a certified as a MBE _____ or WBE _____? (if no leave blank)

MBE/WBE status certified by (circle one) EPA SBA Other _____

DBE Subcontractor/Supplier contacted _____

Address _____

Contact Person: _____ Telephone No. _____

Email _____ Method used to contact (circle one): Phone M a i l Fax

Is entity also a certified as a MBE _____ or WBE _____? (if no leave blank)

MBE/WBE status certified by (circle one) EPA SBA Other _____

Comments _____

Prepared By: _____

Date: _____

(Use additional copies of this sheet if needed)

KDHE PROJECT #

CERTIFICATION REGARDING LOBBYING

CERTIFICATION FOR CONTRACTS, GRANTS, LOANS AND COOPERATIVE AGREEMENTS

The undersigned certifies, to the best of his or her knowledge and belief, that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

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

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

Typed Name & Title of Authorized Representative

Signature and Date of Authorized Representative

American Iron and Steel Certification

1. Identification of American-made Iron and Steel Products: The Bidder certifies that this bid reflects the Bidder's best, good faith effort to identify domestic sources of iron and steel products for every component contained in the bid solicitation where such American-made components are required. The term "iron and steel products" means the following products made primarily of iron or steel - lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and construction materials.
2. Verification of U.S. Production: If this bid is accepted, the Bidder agrees that it will provide, to the Owner, reasonable, sufficient, and timely verification of the U.S. production of each Iron and Steel Product incorporated into the project.
3. Documentation Regarding Non-American-made Iron and Steel: The Bidder certifies that for any Iron or Steel Product that is not American-made but was incorporated in the development of this bid, is allowed by waiver of the U.S. Environmental Protection Agency and such waiver is attached to this certification.

Signature

Date

Name and Title of Signer (Please Print)

Q & A's, Waiver request instructions, and a list of approved waivers can be found at
http://water.epa.gov/grants_funding/aisrequirement.cfm

KDHE SRF Provisions

Contract Provisions for Equal Opportunity

1. The contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the contracting officer setting forth the provisions of this nondiscrimination clause.
2. The contractor will, in all solicitations or advancements for employees placed by or on behalf of the contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex or national origin.
3. The contractor will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the agency contracting officer, advising the labor union or workers' representative of the contractor's commitments under Section 202 of Executive Order No. 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
4. The contractor will comply with all provisions of Executive Order No. 11246 of Sept. 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.
5. The contractor will furnish all information and reports required by Executive Order No. 11246 of September 24, 1965, and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the contracting agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
6. In the event of the contractor's noncompliance with the nondiscrimination clauses of this contract or with any of such rules, regulations, or orders, this contract may be cancelled, terminated, or suspended in whole or in part and the contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in Executive Order No. 11246 of Sept. 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order No. 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.
7. The contractor will include the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of Executive Order No. 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The contractor will take such action with respect to any subcontract or purchase order as may be directed by the Secretary of Labor as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, that in the event the contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction, the contractor may request the United States to enter into such litigation to protect the interests of the United States." [Sec. 202 amended by EO 11375 of Oct. 13, 1967, 32 FR 14303, 3 CFR, 1966-1970 Comp., p. 684, EO 12086 of Oct. 5, 1978, 43 FR 46501, 3 CFR, 1978 Comp., p. 230]

Equal Employment Opportunity is

THE LAW

Private Employers, State and Local Governments, Educational Institutions, Employment Agencies and Labor Organizations

Applicants to and employees of most private employers, state and local governments, educational institutions, employment agencies and labor organizations are protected under Federal law from discrimination on the following bases:

RACE, COLOR, RELIGION, SEX, NATIONAL ORIGIN

Title VII of the Civil Rights Act of 1964, as amended, protects applicants and employees from discrimination in hiring, promotion, discharge, pay, fringe benefits, job training, classification, referral, and other aspects of employment, on the basis of race, color, religion, sex (including pregnancy), or national origin. Religious discrimination includes failing to reasonably accommodate an employee's religious practices where the accommodation does not impose undue hardship.

DISABILITY

Title I and Title V of the Americans with Disabilities Act of 1990, as amended, protect qualified individuals from discrimination on the basis of disability in hiring, promotion, discharge, pay, fringe benefits, job training, classification, referral, and other aspects of employment. Disability discrimination includes not making reasonable accommodation to the known physical or mental limitations of an otherwise qualified individual with a disability who is an applicant or employee, barring undue hardship.

AGE

The Age Discrimination in Employment Act of 1967, as amended, protects applicants and employees 40 years of age or older from discrimination based on age in hiring, promotion, discharge, pay, fringe benefits, job training, classification, referral, and other aspects of employment.

SEX (WAGES)

In addition to sex discrimination prohibited by Title VII of the Civil Rights Act, as amended, the Equal Pay Act of 1963, as amended, prohibits sex discrimination in the payment of wages to women and men performing substantially equal work, in jobs that require equal skill, effort, and responsibility, under similar working conditions, in the same establishment.

GENETICS

Title II of the Genetic Information Nondiscrimination Act of 2008 protects applicants and employees from discrimination based on genetic information in hiring, promotion, discharge, pay, fringe benefits, job training, classification, referral, and other aspects of employment. GINA also restricts employers' acquisition of genetic information and strictly limits disclosure of genetic information. Genetic information includes information about genetic tests of applicants, employees, or their family members; the manifestation of diseases or disorders in family members (family medical history); and requests for or receipt of genetic services by applicants, employees, or their family members.

RETALIATION

All of these Federal laws prohibit covered entities from retaliating against a person who files a charge of discrimination, participates in a discrimination proceeding, or otherwise opposes an unlawful employment practice.

WHAT TO DO IF YOU BELIEVE DISCRIMINATION HAS OCCURRED

There are strict time limits for filing charges of employment discrimination. To preserve the ability of EEOC to act on your behalf and to protect your right to file a private lawsuit, should you ultimately need to, you should contact EEOC promptly when discrimination is suspected:

The U.S. Equal Employment Opportunity Commission (EEOC), 1-800-669-4000 (toll-free) or 1-800-669-6820 (toll-free TTY number for individuals with hearing impairments). EEOC field office information is available at www.eeoc.gov or in most telephone directories in the U.S. Government or Federal Government section. Additional information about EEOC, including information about charge filing, is available at www.eeoc.gov.

Employers Holding Federal Contracts or Subcontracts

Applicants to and employees of companies with a Federal government contract or subcontract are protected under Federal law from discrimination on the following bases:

RACE, COLOR, RELIGION, SEX, NATIONAL ORIGIN

Executive Order 11246, as amended, prohibits job discrimination on the basis of race, color, religion, sex or national origin, and requires affirmative action to ensure equality of opportunity in all aspects of employment.

INDIVIDUALS WITH DISABILITIES

Section 503 of the Rehabilitation Act of 1973, as amended, protects qualified individuals from discrimination on the basis of disability in hiring, promotion, discharge, pay, fringe benefits, job training, classification, referral, and other aspects of employment. Disability discrimination includes not making reasonable accommodation to the known physical or mental limitations of an otherwise qualified individual with a disability who is an applicant or employee, barring undue hardship. Section 503 also requires that Federal contractors take affirmative action to employ and advance in employment qualified individuals with disabilities at all levels of employment, including the executive level.

DISABLED, RECENTLY SEPARATED, OTHER PROTECTED, AND ARMED FORCES SERVICE MEDAL VETERANS

The Vietnam Era Veterans' Readjustment Assistance Act of 1974, as amended, 38 U.S.C. 4212, prohibits job discrimination and requires affirmative action to employ and advance in employment disabled veterans, recently separated veterans (within

three years of discharge or release from active duty), other protected veterans (veterans who served during a war or in a campaign or expedition for which a campaign badge has been authorized), and Armed Forces service medal veterans (veterans who, while on active duty, participated in a U.S. military operation for which an Armed Forces service medal was awarded).

RETALIATION

Retaliation is prohibited against a person who files a complaint of discrimination, participates in an OFCCP proceeding, or otherwise opposes discrimination under these Federal laws.

Any person who believes a contractor has violated its nondiscrimination or affirmative action obligations under the authorities above should contact immediately:

The Office of Federal Contract Compliance Programs (OFCCP), U.S. Department of Labor, 200 Constitution Avenue, N.W., Washington, D.C. 20210, 1-800-397-6251 (toll-free) or (202) 693-1337 (TTY). OFCCP may also be contacted by e-mail at OFCCP-Public@dol.gov, or by calling an OFCCP regional or district office, listed in most telephone directories under U.S. Government, Department of Labor.

Programs or Activities Receiving Federal Financial Assistance

RACE, COLOR, NATIONAL ORIGIN, SEX

In addition to the protections of Title VII of the Civil Rights Act of 1964, as amended, Title VI of the Civil Rights Act of 1964, as amended, prohibits discrimination on the basis of race, color or national origin in programs or activities receiving Federal financial assistance. Employment discrimination is covered by Title VI if the primary objective of the financial assistance is provision of employment, or where employment discrimination causes or may cause discrimination in providing services under such programs. Title IX of the Education Amendments of 1972 prohibits employment discrimination on the basis of sex in educational programs or activities which receive Federal financial assistance.

INDIVIDUALS WITH DISABILITIES

Section 504 of the Rehabilitation Act of 1973, as amended, prohibits employment discrimination on the basis of disability in any program or activity which receives Federal financial assistance. Discrimination is prohibited in all aspects of employment against persons with disabilities who, with or without reasonable accommodation, can perform the essential functions of the job.

If you believe you have been discriminated against in a program of any institution which receives Federal financial assistance, you should immediately contact the Federal agency providing such assistance.

Contract Provisions for the Kansas Act Against Discrimination

(a) Except as provided by subsection (c), every contractor for or on behalf of the State and any county or municipality or other political subdivision of the State, or any agency of or authority created by any of the foregoing, for the construction, alteration, or repair of any public building or public work or for the acquisition of materials, equipment, supplies, or services shall contain provisions by which the contractor agrees that:

- (1) The contractor shall observe the provisions of the Kansas Act Against Discrimination and shall not discriminate against any person in the performance of work under the present contract because of race, religion, color, sex, disability, national origin, or ancestry;
- (2) In all solicitations or advertisements for employees, the contractor shall include the phrase "equal opportunity employer" or a similar phrase to be approved by the Commission;
- (3) If the contractor fails to comply with the manner in which the contractor reports to the Commission in accordance with the provisions of K.S.A.44-1031 and amendments thereto, the contractor shall be deemed to have breached the present contract and it may be cancelled, terminated, or suspended, in whole or in part, by the contracting agency;
- (4) If the contractor is found guilty of a violation of the Kansas Act Against Discrimination under a decision or order of the Commission which has become final, the contractor shall be deemed to have breached the present contract and it may be cancelled, terminated or suspended, in whole, or in part, by the contracting agency;
- (5) The contractor shall include the provisions of subsections (a)(1) through (4) in every subcontract or purchase order so that such provisions will be binding upon such subcontractor or vendor.

(b) The Kansas Human Rights Commission shall not be prevented hereby from requiring reports of contractors found to be not in compliance with the Kansas Act Against Discrimination.

(c) The provisions of this section shall not apply to a contract entered into by a contractor:

- (1) Who employs fewer than four employees during the term of such contract; or
- (2) Whose contracts with the governmental entity letting such contract cumulatively total \$5,000 or less during the fiscal year of such governmental entity.

Contract Provisions for right of entry by KDHE

The Contractor shall secure the right of entry to the project site for representatives of the Kansas Department of Health and Environment, so they may have access to the work whenever it is in preparation or progress and also to any books, documents, papers and records of the Contractor which are directly pertinent to that specific contract for the purpose of making audit, examinations, excerpts and transcriptions. Proper facilities and safe conditions must be provided for access and inspections, including advice regarding site safety procedures and programs to allow compliance.

Contract Provisions for Historical and Archeological Deposits

If during the course of construction evidence of deposits of historical or archeological interest is found, the contractor shall cease operations affecting the find and shall notify the owner who shall notify the Kansas Department of Health and Environment and the Executive Director, Kansas State Historical Society, 6425 SW 6th Street, Topeka, Kansas 66615. No further disturbance of the deposits shall ensue until the contractor has

been notified by the owner that he may proceed. The owner will issue a notice to proceed only after the State official has surveyed the find and made a determination to Kansas Department of Health and Environment and the owner. Compensation to the contractor, if any, for lost time or changes in construction to avoid the find, shall be determined in accordance with changed conditions or change order provisions of the specifications.

Contract Provisions for NPDES General Permit Coverage for Discharges of Stormwater Runoff from Construction Activities

The owner or Contractor must obtain, prior to construction, permit coverage from KDHE to discharge stormwater runoff associated with construction activity for most any project which disturbs one acre or more of soils. A Notice of Intent form (NOI) must be submitted to KDHE 60 days before the start of construction and a permit determination from KDHE must be made before construction can begin. The Kansas construction stormwater general permit, a Notice of Intent (application form), a frequently asked questions file, and supplemental materials are available on-line on the KDHE Stormwater Web Page at www.kdhe.state.ks.us/stormwater.

Contract Provisions for Restrictions on Lobbying

The Contractor agrees to comply with Title 40 CRF Part 34, New Restrictions on Lobbying. **A Certification form must be submitted with the bid documents.**

Contract Provisions for the Trafficking Victims Protection Act of 2000

The Contractor, its employees, sub-contractors, and sub-contractors employees under any SRF Loan Agreement, may not engage in severe forms of trafficking in persons during the period of time that the award is in effect; procure a commercial sex act during the period of time that the award is in effect; or use forced labor in the performance of the award or sub-awards under the award.

Contract Provisions for Suspension and Debarment

The Contractor certifies that it is not suspended or debarred from participating in federal assistance and benefit programs and further agrees to fully comply with Subpart C of 2 CFR Part 180 and 2 CFR Part 1532, entitled “Responsibilities of Participants Regarding Transactions.” The Contractor must ensure that any lower tier covered transaction, as described in Subpart B of 2 CFR Part 180 and 2 CFR Part 1532, entitled “Covered Transactions,” includes a term or condition requiring compliance with Subpart C. The Contractor agrees that failing to disclose the required information in 2 CFR 180.335 may result in the delay or negation of this assistance agreement, or pursuance of legal remedies, including suspension and debarment.

Contract Provisions for Non Discrimination

The contractor must comply with Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title IX of the Education Amendments of 1972, the Age Discrimination Act of 1975, and a variety of program-specific statutes with nondiscrimination requirements.

Other civil rights laws may impose additional requirements on the contractor. These laws include, but are not limited to, Title VII of the Civil Rights Act of 1964 (prohibiting race, color, national origin, religion, and sex discrimination in employment), the Americans with Disabilities Act (prohibiting disability discrimination in employment and in services provided by State and local governments, businesses, and non-profit agencies), and the Fair Housing Act (prohibiting race, color, national origin, age, family status, and disability discrimination in housing), as well as any other applicable civil rights laws.

Contract Provisions for Non Segregated Facilities

The contractor must ensure that facilities provided for employees are provided in such a manner that segregation on the basis of race, color, religion, sex or national origin cannot result. The contractor may neither require such segregated use by written or oral policies nor tolerate such use by employee custom. The contractor's obligation extends further to ensuring that its employees are not assigned to perform their services at any location, under the contractor's control, where the facilities are segregated. This obligation extends to all contracts containing the equal opportunity clause regardless of the amount of the contract. The term "facilities," as used in this section, means waiting rooms, work areas, restaurants and other eating areas, time clocks, restrooms, wash rooms, locker rooms, and other storage or dressing areas, parking lots, drinking fountains, recreation or entertainment areas, transportation, and housing provided for employees; *Provided*, That separate or single-user restrooms and necessary dressing or sleeping areas shall be provided to assure privacy between the sexes.

Contract Provisions for American Iron and Steel

All of the iron and steel products used in the project must be produced in the United States. The term "iron and steel products" means the following products made primarily of iron or steel - lined or unlined pipes and fittings, manhole covers and other municipal castings, hydrants, tanks, flanges, pipe clamps and restraints, valves, structural steel, reinforced precast concrete, and construction materials. **A Certification form must be submitted with the bid documents.**

The following definitions apply to this provision.

Municipal castings are cast iron or steel infrastructure products that are melted and cast. They typically provide access, protection, or housing for components incorporated into utility owned drinking water, storm water, wastewater, and surface infrastructure. They are typically made of grey or ductile iron, or steel. Examples of municipal castings are access hatches, ballast screen, benches (Iron or Steel), bollards, cast bases, cast iron hinged hatches, square and rectangular; cast iron riser rings, catch basin inlet, cleanout/monument boxes, construction covers and frames, curb and corner guards, curb openings, detectable warning plates, downspout shoes (boot, inlet), drainage grates, frames and curb inlets, inlets; junction boxes, lampposts, manhole covers, rings and frames, and risers.

Construction materials are those articles, materials, or supplies made primarily of iron and steel, that are permanently incorporated into the project, not including mechanical and/or electrical components, equipment and systems. Some of these products may overlap with what is also considered "structural steel". This includes, but is not limited to, the following products: wire rod, bar, angles, concrete reinforcing bar, wire, wire cloth, wire rope and cables, tubing, framing, joists, trusses, fasteners (i.e., nuts and bolts), welding rods, decking, grating, railings, stairs, access ramps, fire escapes, ladders, wall panels, dome structures, roofing, ductwork, surface drains, cable hanging systems, manhole steps, fencing and fence tubing, guardrails, doors, and stationary screens.

Mechanical and electrical components, equipment and systems are NOT considered construction materials. Mechanical equipment is typically that which has motorized parts and/or is powered by a motor. Electrical equipment is typically any machine powered by electricity and includes components that are part of the electrical distribution system. The following examples (including their appurtenances necessary for their intended use and operation) are NOT considered construction materials: pumps, motors, gear reducers, drives (including variable frequency drives (VFDs)), electric/pneumatic/manual accessories used to operate valves (such as electric valve actuators), mixers, gates, motorized screens (such as traveling screens), blowers/aeration equipment, compressors, meters, sensors, controls and switches, supervisory control and data acquisition (SCADA), membrane bioreactor systems, membrane filtration systems, filters, clarifiers and clarifier mechanisms, rakes, grinders, disinfection systems, presses (including belt presses), conveyors, cranes, HVAC (excluding ductwork), water heaters, heat exchangers, generators, cabinetry and housings

(such as electrical boxes/enclosures), lighting fixtures, electrical conduit, emergency life systems, metal office furniture, shelving, laboratory equipment, analytical instrumentation, and dewatering equipment.

Noncompliance with this provision is only allowed through a waiver issued by the U.S. Environmental Protection Agency. Q&A documents, waiver request instructions, and a list of proposed and approved waivers can be found at http://water.epa.gov/grants_funding/aisrequirement.cfm .

Davis Bacon Wage Rate Contract Provisions

(1) Minimum wages.

(i) All laborers and mechanics employed or working upon the site of the work (or under the United States Housing Act of 1937 or under the Housing Act of 1949 in the construction or development of the project), will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (a)(1)(iv) of this section; also, regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in § 5.5 (a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: Provided, that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under paragraph (a)(1)(ii) of this section) and the Davis-Bacon poster

(WH-1321) shall be posted at all times by the contractor and its subcontractors at the site of the work in a prominent and accessible place where it can be easily seen by the workers.

Loan Recipients may obtain wage determinations from the U.S. Department of Labor's web site, www.wdol.gov.

(ii)(A) The Loan Recipient(s), on behalf of EPA, shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The EPA award official shall coordinate with the Department of Labor Wage and Hour Division to approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination; and

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the Loan Recipient(s) agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the Loan Recipient (s) to the State award official. The State award official will transmit the report, to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the State award official or will notify the State award official within the 30-day period that additional time is necessary.

(C) In the event the contractor, the laborers or mechanics to be employed in the classification or their representatives, and the and the Loan Recipient(s) do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits, where appropriate), the award official shall refer the questions, including the views of all interested parties and the recommendation of the State award official, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer award official or will notify the contracting officer award official within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to paragraphs (a)(1)(ii)(B) or (C) of this section, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

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

(2) Withholding.

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

(3) Payrolls and basic records.

(i) Payrolls and basic records relating thereto shall be maintained by the contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work (or under the United States Housing Act of 1937, or under the Housing Act of 1949, in the construction or development of the project). Such records shall contain the name, address, and social security

number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in section 1(b)(2)(B) of the Davis-Bacon Act), daily and weekly number of hours worked, deductions made and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5 (a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the contractor shall maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The contractor shall submit weekly, for each week in which any contract work is performed, a copy of all payrolls to the Loan Recipient, that is, the entity that receives the sub-grant or loan from the State capitalization grant recipient. Such documentation shall be available on request of the State recipient or EPA. As to each payroll copy received, the Loan Recipient shall provide written confirmation in a form satisfactory to the State indicating whether or not the project is in compliance with the requirements of 29 CFR 5.5(a)(1) based on the most recent payroll copies for the specified week. The payrolls shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on the weekly payrolls.

Instead the payrolls shall only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose from the Wage and Hour Division Web site at <http://www.dol.gov/esa/whd/forms/wh347instr.htm> or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker, and shall provide them upon request to the Loan Recipient (s) for transmission to the State or EPA if requested by EPA, the State, the contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the Loan Recipient (s).

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

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

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

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

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

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

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

(4) Apprentices and trainees--

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

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage

determination which provides for less than full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate who is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal employment opportunity. The utilization of apprentices, trainees and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR part 30.

(5) Compliance with Copeland Act requirements. The contractor shall comply with the requirements of 29 CFR part 3, which are incorporated by reference in this contract.

(6) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR 5.5(a)(1) through (10) and such other clauses as the EPA determines may be appropriate, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR 5.5.

(7) Contract termination: debarment. A breach of the contract clauses in 29 CFR 5.5 may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

(8) Compliance with Davis-Bacon and Related Act requirements. All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR parts 1, 3, and 5 are herein incorporated by reference in this contract.

(9) Disputes concerning labor standards. Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the contractor (or any of its subcontractors) and Loan Recipient(s), State, EPA, the U.S. Department of Labor, or the employees or their representatives.

(10) Certification of eligibility.

(i) By entering into this contract, the contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 U.S.C. 1001.

(11) Contract Provision for Contracts in Excess of \$100,000.

(a) The following provisions apply to all contracts that are in excess of \$100,000. As used in these provisions, the terms laborers and mechanics include watchmen and guards.

(1) Overtime requirements. No contractor or subcontractor contracting for any part of the contract work which may require or involve the employment of laborers or mechanics shall require or permit any such laborer or mechanic in any workweek in which he or she is employed on such work to work in excess of forty hours in such workweek unless such laborer or mechanic receives compensation at a rate not less than one and one-half times the basic rate of pay for all hours worked in excess of forty hours in such workweek.

(2) Violation; liability for unpaid wages; liquidated damages. In the event of any violation of the clause set forth in paragraph (a)(1) of this section the contractor and any subcontractor responsible therefore shall be liable for the unpaid wages. In addition, such contractor and subcontractor shall be liable to the United States (in the case of work done under contract for the District of Columbia or a territory, to such District or to such territory), for liquidated damages. Such liquidated damages shall be computed with respect to each individual laborer or mechanic, including watchmen and guards, employed in violation of the clause set forth in paragraph (a)(1) of this section, in the sum of \$10 for each calendar day on which such individual was required or permitted to work in excess of the standard workweek of forty hours without payment of the overtime wages required by the clause set forth in paragraph (a)(1) of this section.

(3) Withholding for unpaid wages and liquidated damages. The municipality, upon written request of the EPA Award Official or an authorized representative of the Department of Labor, shall withhold or cause to be withheld, from any moneys payable on account of work performed by the contractor or subcontractor under any such contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to the Contract Work Hours and Safety Standards Act, which is held by the same prime contractor, such sums as may be determined to be necessary to satisfy any liabilities of such contractor or subcontractor for unpaid wages and liquidated damages as provided in the clause set forth in paragraph (b)(2) of this section.

(4) Subcontracts. The contractor or subcontractor shall insert in any subcontracts the clauses set forth in paragraph (a)(1) through (4) of this section and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for compliance by any subcontractor or lower tier subcontractor with the clauses set forth in paragraphs (a)(1) through (4) of this section.

(b) In addition to the clauses contained in (a)(3), above, in any contract subject only to the Contract Work Hours and Safety Standards Act and not to any of the other statutes cited in 29 CFR 5.1, the contractor or subcontractor shall maintain payrolls and basic payroll records during the course of the work and shall preserve them for a period of three years from the completion of the contract for all laborers and mechanics, including guards and watchmen, working on the contract. Such records shall contain the name and address of each such employee, social security number, correct classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. Further, the records to be maintained under this paragraph shall be made available by the contractor or subcontractor for inspection, copying, or transcription by authorized representatives of the (write the name of agency) and the Department of Labor, and the contractor or subcontractor will permit such representatives to interview employees during working hours on the job.

Disadvantaged Business Enterprise Contract Provisions

The contractor shall not discriminate on the basis of race, color, national origin or sex in the performance of this contract. The contractor shall carry out applicable requirements of 40 CFR part 33 in the award and administration of contracts awarded under EPA financial assistance agreements. Failure by the contractor to carry out these requirements is a material breach of this contract which may result in the termination of this contract or other legally available remedies.

A Disadvantaged Business Enterprise (DBE) includes Women's Business Enterprises, (WBE) Minority Business Enterprises (MBE), a Small Business Enterprises (SBE); a Small Business in Rural Area (SBRA); a Labor Surplus Area Firm (LSAF); or a Historically Underutilized Business (HUB) Zone Small Business Concern or a concern under a successor program.

The contractor must also adopt a fair share objective of awarding 4.1/% of the contract amount to Minority Business Enterprises (MBE's) and 6.9% of the contract amount to Women's Business Enterprises (WBE's). This fair share objective is not a quota and the contractor cannot be penalized for failure to meet this objective.

The contractor is required to make the Good Faith Efforts and apply the administrative requirements listed below for any subcontracts.

Good Faith Efforts

1. Ensure DBEs are made aware of subcontracting opportunities to the fullest extent practicable through outreach and recruitment activities.

This step may include sending letters or making other personal contacts with DBEs. DBEs should be contacted when other potential subcontractors/suppliers are contacted, within reasonable time (i.e. minimum of fifteen days) prior to bid submission or closing date for receipt of initial offers. Those letters or other contacts should communicate the following:

- i. Specific description of the work to be subcontracted or supplies to be purchased;
 - ii. How and where to obtain a copy of plans and specifications or other detailed information needed to prepare a detailed price quotation;
 - iii. Date the quotation is due to the prime contractor;
 - iv. Name, address, and phone number of the person in the prime contractor's firm whom the prospective DBE subcontractor/supplier should contact for additional information.
2. Make information on forthcoming opportunities available to DBEs and arrange time frames for contracts and establish delivery schedules, where the requirements permit, in a way that encourages and facilitates participation by DBEs in the competitive process. This includes, whenever possible, posting solicitations for bids or proposals for a minimum of 30 calendar days before the bid or proposal closing date.

3. Consider in the contracting process whether firms competing for large contracts could subcontract with DBEs.
4. Encourage contracting with a consortium of DBEs when a contract is too large for one of these firms to handle individually.
5. Use the services and assistance of the SBA and the Minority Business Development Agency of the Department of Commerce.

DBE Administrative Requirements

The contractor:

1. Must pay its subcontractor for satisfactory performance not more than 30 days from the prime contractor's receipt of payment.
2. Must notify KDHE in writing prior to termination of a DBE subcontractor for convenience.
3. Must employ the good faith efforts when soliciting a replacement subcontractor, if the original subcontractor fails to complete work for any reason.

Determination of Compliance

If Prime contractors award any subcontracts, they must demonstrate compliance with DBE requirements in order to be deemed responsive prior to contract award. Demonstration of compliance shall include a list of DBE subcontractors contacted and the method used to contact them (the attached Demonstration of Compliance with DBE Good Faith Efforts Worksheet can be used for this purpose).

EMPLOYEE RIGHTS UNDER THE DAVIS-BACON ACT

FOR LABORERS AND MECHANICS EMPLOYED ON FEDERAL OR FEDERALLY ASSISTED CONSTRUCTION PROJECTS

THE UNITED STATES DEPARTMENT OF LABOR WAGE AND HOUR DIVISION

**PREVAILING
WAGES**

You must be paid not less than the wage rate listed in the Davis-Bacon Wage Decision posted with this Notice for the work you perform.

OVERTIME

You must be paid not less than one and one-half times your basic rate of pay for all hours worked over 40 in a work week. There are few exceptions.

ENFORCEMENT

Contract payments can be withheld to ensure workers receive wages and overtime pay due, and liquidated damages may apply if overtime pay requirements are not met. Davis-Bacon contract clauses allow contract termination and debarment of contractors from future federal contracts for up to three years. A contractor who falsifies certified payroll records or induces wage kickbacks may be subject to civil or criminal prosecution, fines and/or imprisonment.

APPRENTICES

Apprentice rates apply only to apprentices properly registered under approved Federal or State apprenticeship programs.

PROPER PAY

If you do not receive proper pay, or require further information on the applicable wages, contact the Contracting Officer listed below:

or contact the U.S. Department of Labor’s Wage and Hour Division.



For additional information:
1-866-4-USWAGE
(1-866-487-9243) TTY: 1-877-889-5627



WWW.WAGEHOUR.DOL.GOV

OMB Control Number: 9000-0066
Expiration Date: 5/31/2025

SRF Provisions Page 24

NAME OF CONTRACTOR ☐ OR SUBCONTRACTOR ☐				ADDRESS												OMB No.: 1215-0149 Expires: 12/31/2011						
PAYROLL NO.			FOR WEEK ENDING				PROJECT AND LOCATION						PROJECT OR CONTRACT NO.									
(1)	(2)	(3)	OT OR ST.	(4) DAY AND DATE								(5)	(6)	(7)	(8) DEDUCTIONS					(9)		
NAME AND INDIVIDUAL IDENTIFYING NUMBER (e.g., LAST FOUR DIGITS OF SOCIAL SECURITY NUMBER) OF WORKER	NO. OF WITHHOLDING EXEMPTIONS	WORK CLASSIFICATION										TOTAL HOURS	RATE OF PAY	GROSS AMOUNT EARNED	FICA	WITH-HOLDING TAX			OTHER	TOTAL DEDUCTIONS	NET WAGES PAID FOR WEEK	
				HOURS WORKED EACH DAY																		
			O																			
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Date _____

I, _____
(Name of Signatory Party) (Title)

do hereby state:

(1) That I pay or supervise the payment of the persons employed by _____ on the _____
(Contractor or Subcontractor)
_____ ; that during the payroll period commencing on the _____
(Building or Work)
_____ day of _____, _____, and ending the _____ day of _____, _____,
all 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 _____
_____ from the full
(Contractor or Subcontractor)

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 C.F.R. 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. § 3145), and described below:

(2) That any payrolls otherwise under this contract required to be submitted for the above period are
correct and complete; that the wage rates for laborers or mechanics contained therein are not less than the
applicable wage rates contained in any wage determination incorporated into the contract; that the
classifications set forth therein for each laborer or mechanic conform with 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 FRINGE 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, payments of fringe benefits as listed in the contract
have been or will be made to appropriate programs for the benefit of such
employees, except as noted in section 4(c) below.

(b) WHERE FRINGE BENEFITS ARE PAID IN CASH

☐ – Each laborer or mechanic listed in the above referenced payroll has been paid,
as indicated on the payroll, an amount not less than the sum of the applicable
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 AND SECTION 231 OF TITLE 31
OF THE UNITED STATES CODE.

WAGE RATE DETERMINATION

The wage rate determination found on the following pages must be utilized for the duration of the contract. Each class of workers (including workers in subcontracts) must be paid at least the indicated hourly rate and fringe for such class. If worker compensation includes fringe benefits recognized by the U.S. Department of Labor, then verification of payment of these benefits must be made to the Municipality (Owner) with the first submitted payroll report. If worker compensation does not include fringe benefits then workers must be paid the indicated fringe rate in cash.

If a particular class of worker is not listed on the wage rate determination, but is utilized for the project, Standard Form 1444 must be completed by the contractor and submitted to the Municipality (Owner). The U.S. Department of Labor will determine if the wage rate indicated on the submitted Standard Form 1444 is acceptable.

Workers must be paid weekly. Any worker who works more than 40 hours a week must be paid one and one-half times the base pay plus all fringe benefits. Weekly payroll reports shall be submitted to the Municipality (Owner) for every week until the job is complete even if no work is performed.

The Contractor is responsible for all subcontractor compliance and reporting.

"General Decision Number: KS20240161 04/05/2024

Superseded General Decision Number: KS20230161

State: Kansas

Construction Type: Heavy

County: Wyandotte County in Kansas.

HEAVY CONSTRUCTION PROJECTS

Note: Contracts subject to the Davis-Bacon Act are generally required to pay at least the applicable minimum wage rate required under Executive Order 14026 or Executive Order 13658. Please note that these Executive Orders apply to covered contracts entered into by the federal government that are subject to the Davis-Bacon Act itself, but do not apply to contracts subject only to the Davis-Bacon Related Acts, including those set forth at 29 CFR 5.1(a)(1).

If the contract is entered into on or after January 30, 2022, or the contract is renewed or extended (e.g., an option is exercised) on or after January 30, 2022:	• Executive Order 14026 generally applies to the contract. • The contractor must pay all covered workers at least \$17.20 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract in 2024.
If the contract was awarded on or between January 1, 2015 and January 29, 2022, and the contract is not renewed or extended on or after January 30, 2022:	• Executive Order 13658 generally applies to the contract. • The contractor must pay all covered workers at least \$12.90 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours performing on that contract in 2024.

The applicable Executive Order minimum wage rate will be adjusted annually. If this contract is covered by one of the Executive Orders and a classification considered necessary for

performance of work on the contract does not appear on this wage determination, the contractor must still submit a conformance request.

Additional information on contractor requirements and worker protections under the Executive Orders is available at <http://www.dol.gov/whd/govcontracts>.

Modification Number	Publication Date
0	01/05/2024
1	04/05/2024

CARP1011-001 05/01/2023

	Rates	Fringes
CARPENTER.....	\$ 43.28	21.25

ELEC0271-006 12/01/2023

	Rates	Fringes
ELECTRICIAN.....	\$ 36.67	17.57

ELEC0304-001 07/02/2023

	Rates	Fringes
LINE CONSTRUCTION (Lineman).....	\$ 48.43	23.88

ENGI0101-049 04/01/2023

	Rates	Fringes
POWER EQUIPMENT OPERATOR		
Bobcat/Skid Steer/Skid		
Loader.....	\$ 39.02	21.44
Bulldozer.....	\$ 39.02	21.44
Forklift.....	\$ 39.02	21.44
Grader/Blade.....	\$ 39.02	21.44
Roller.....	\$ 39.02	21.44

* IRON0010-002 04/01/2024

	Rates	Fringes
IRONWORKER.....	\$ 38.00	33.56

LAB01290-003 04/01/2023

	Rates	Fringes
LABORER (Pipelayer).....	\$ 35.36	17.06

 * PLAS0518-003 04/01/2024

	Rates	Fringes
CEMENT MASON/CONCRETE FINISHER...	\$ 37.61	18.41

 SUKS2022-014 09/15/2022

	Rates	Fringes
CARPENTER, Excludes Form Work....	\$ 27.39	7.74
LABORER: Common or General.....	\$ 30.73	16.33
OPERATOR: Backhoe/Excavator/Trackhoe.....	\$ 37.02	19.57
OPERATOR: Crane.....	\$ 34.41	11.22
OPERATOR: Loader.....	\$ 35.63	19.49
TRUCK DRIVER: Dump Truck.....	\$ 32.95	19.49

 WELDERS - Receive rate prescribed for craft performing
 operation to which welding is incidental.

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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave for Federal Contractors applies to all contracts subject to the Davis-Bacon Act for which the contract is awarded (and any solicitation was issued) on or after January 1, 2017. If this contract is covered by the EO, the contractor must provide employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO

is available at
<https://www.dol.gov/agencies/whd/government-contracts>.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of ""identifiers"" that indicate whether the particular rate is a union rate (current union negotiated rate for local), a survey rate (weighted average rate) or a union average rate (weighted union average rate).

Union Rate Identifiers

A four letter classification abbreviation identifier enclosed in dotted lines beginning with characters other than ""SU"" or ""UAVG"" denotes that the union classification and rate were prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2014. PLUM is an abbreviation identifier of the union which prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. 07/01/2014 is the effective date of the most current negotiated rate, which in this example is July 1, 2014.

Union prevailing wage rates are updated to reflect all rate changes in the collective bargaining agreement (CBA) governing this classification and rate.

Survey Rate Identifiers

Classifications listed under the ""SU"" identifier indicate that no one rate prevailed for this classification in the survey and the published rate is derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As this weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SULA2012-007 5/13/2014. SU indicates

the rates are survey rates based on a weighted average calculation of rates and are not majority rates. LA indicates the State of Louisiana. 2012 is the year of survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. 5/13/2014 indicates the survey completion date for the classifications and rates under that identifier.

Survey wage rates are not updated and remain in effect until a new survey is conducted.

Union Average Rate Identifiers

Classification(s) listed under the UAVG identifier indicate that no single majority rate prevailed for those classifications; however, 100% of the data reported for the classifications was union data. EXAMPLE: UAVG-OH-0010 08/29/2014. UAVG indicates that the rate is a weighted union average rate. OH indicates the state. The next number, 0010 in the example, is an internal number used in producing the wage determination. 08/29/2014 indicates the survey completion date for the classifications and rates under that identifier.

A UAVG rate will be updated once a year, usually in January of each year, to reflect a weighted average of the current negotiated/CBA rate of the union locals from which the rate is based.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- * an existing published wage determination
- * a survey underlying a wage determination
- * a Wage and Hour Division letter setting forth a position on a wage determination matter
- * a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour National Office because National Office has responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION"

TECHNICAL SPECIFICATIONS

SECTION 1100 – PROGRESS AND PAYMENT

PART 1 - GENERAL

1.01 Measurement and Payment

- A. Scope: This section lists bid items, their unit of payment, method and limits of measurement, and subsidiary work included in the pay item.
- B. Entire Cost: The unit prices shown in the bid shall reflect the entire cost for the construction of the complete work, in conformance with the plans and specifications. Cost for items called for in or reasonably inferred as necessary from the construction documents, for which a specific unit price or lump sum price is not listed in the bid, shall be included in the price for the closest applicable items.
- C. Non-Pay Items Subsidiary to the Work as a Whole: The following items are subsidiary to the whole work. The cost of these items shall be balanced throughout the separate pay items. Timely completion of subsidiary work shall be a condition for recommendation of progress payments.

Subsidiary items: all supervision, testing, labor, materials, equipment, and all necessary incidentals required to furnish and install the Work, as well as payment for mobilization, bonds, insurance, permits, and licenses; profit, overhead, markups, safety, and coordination; Contractor's supervision, work plan, progress schedules, and site meetings; environmental controls; temporary facilities; temporary fencing; all erosion control materials and installation; all clearing and grubbing; connection to existing manholes, including installation of new line into the manhole, reshaping the invert to accept the flows; connection to existing pipes; trench excavation; rock excavation; embedment; backfill, granular trench backfill; disposal of excavated material not used as backfill; dewatering as required; bypass pumping; compaction; granular backfill material or concrete required by trench widths exceeding the maximum allowable trench width for any pipe as shown on the plans; concrete encasement as indicated on the plans; impervious ditch checks as indicated on the plans; existing utility removal, replacement and relocation; parking and traffic control; photographic record; job site water, electrical power, trash and sanitary services, field office, and project sign; construction staking and layout; protection and restoration of existing improvements and utilities; adjustment, relocation and repair of existing water service lines including service meter boxes and service shut off valves; protection and repair of completed portions of the work; correction of defective work; surface restoration; replacement of unsuitable pipe foundation material; driveway, sidewalk, curb and gutter, and pavement removal and replacement; fence repair and replacement; tree removal and saving; and sodding and seeding required therewith.

Existing conditions on the Rehabilitation Schedules, including manhole and pipe depths, diameters, and materials; pipe lengths; and point repair locations; are from previous inspection efforts and/or sewer records and have not been field verified or surveyed. Subsidiary items shall also include field inspection and verification of existing conditions as necessary to perform the work, including confirmation of depths, diameters, and materials; presence of drop pipes; and number and size of pipes entering/existing manholes, prior to installation.

- D. The Contractor shall accept the compensation, as provided in the Contract, in full payment for furnishing all materials, labor, tools and equipment necessary to the completed work and for performing all work contemplated and embraced under the Contract; also, for loss or damage arising from the nature of the work, or from the action of the elements or from any unforeseen difficulties which may be encountered during the prosecution of the work until the

final acceptance by the Owner, and for all risks of every description connected with the prosecution of the work; also, for all expenses incurred in consequence of the suspension or discontinuance of the work as herein specified; and for completing the work according to the Contract Documents.

- E. Contractor shall make partial payments to Subcontractors for work completed.
- F. Measurement and payment for each work item shall be in accordance with the following:

A. CURED-IN-PLACE PIPE (CIPP) LINER (GRAVITY SANITARY AND STORM)

ITEMS A-1 through A-15 Install Gravity Sewer CIPP Liner

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the pipe diameter and liner thickness specified.

All costs associated with the installation of CIPP including but not limited to take and submit pre-construction photographs, all cleaning (including light and heavy cleaning) and repairs of sewer required to perform pre-construction CCTV and to install the CIPP, cutting of protruding service connections, investigation and determination of active services, locating manholes, verifying pipe depth, bypass pumping, installation of CIPP end seals (water stops), installation and placement and curing of CIPP Liner, reinstating active service connections, strength and tightness testing, backfilling and restoration as required, and post-rehabilitation CCTV inspection and reports shall be included in the Unit Price for the size of CIPP installed.

Contractor shall submit post lining CCTV prior to payment. CCTV data shall be reviewed and approved by Owner/Engineer prior to payment being made.

Unit of measurement is linear foot, field measure; accurate to the nearest foot. Measurement shall run from center of manhole/structure to center of manhole/structure.

B. CURED-IN-PLACE PIPE (CIPP) LINER ADDITIONAL THICKNESS (GRAVITY SANITARY AND STORM)

ITEMS B-1 through B-15 CIPP Liner Additional Thickness

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the pipe diameter and the additional liner thickness required for a pipe as approved by the Engineer.

All costs associated with adding additional material thickness to a proposed CIPP liner shall be included.

C. EXCAVATION REQUIRED PIPE REHABILITATION (POINT REPAIRS: GRAVITY SANITARY AND STORM)

ITEMS C-1 through C-12 Install Pipe

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the pipe diameter, pipe depth, pipe material, and surface condition specified.

All costs associated with pipe point repairs including but not limited to site preparation and excavation; existing utility removal, replacement, or relocation; disposal of excavated material not used for backfill; dewatering/bypass pumping as necessary; backfilling and compaction; final grading; debris disposal; surface restoration to match or exceed existing conditions; detailed construction staking; clearing and grubbing; connection to existing manholes or structures; fittings and connections to existing pipe; removal of existing pipe; location and verification of service laterals; granular backfill material or concrete required by trench widths exceeding the maximum allowable trench width; abandonment or removal of existing pipe; reconnection of existing active service laterals with tee connections, piping and fittings of the correct size; removal and replacement of unsuitable pipe foundation material; street, driveway, sidewalk, curb and gutter, and pavement removal and replacement to match existing; fence repair and replacement; tree trimming, removal and disposal, and protection/saving; and resetting and re-establishing property corners, pins, bars, or markers removed; and post-construction CCTV inspection and reports

Contractor shall submit post-construction CCTV prior to payment. CCTV data shall be reviewed and approved by Owner/Engineer prior to payment being made.

Measurement for payment shall be for each linear foot of DR26 PVC pipe installed as measured along the centerline of the pipe from end to end of the pipe installed, measured to the nearest foot as indicated. Pipe depth at the flow line shall be measured at the pipe beginning and end point, with the average of the two measurements being used for determination of depth for payment.

D. EXCAVATION REQUIRED PIPE REPLACEMENT (TOTAL PIPE REPLACEMENT: GRAVITY SANITARY AND STORM)

ITEMS D-1 through D-26 Install Pipe

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the pipe diameter, pipe depth, pipe material, and surface condition specified. When total pipe replacement is indicated, the new pipe diameter shall be the same as the existing pipe diameter, unless otherwise indicated on the Rehabilitation Schedule.

The unit price shall be the total cost for, but not limited to, furnishing all supervision, labor, materials, equipment, and all necessary incidentals needed to install sewer pipe as shown, specified, and directed. The unit price shall include, but not be limited to, take and submit pre-construction photographs; traffic control; safety equipment; site preparation and excavation; existing utility removal, replacement, or relocation; disposal of excavated material not used for backfill; dewatering/bypass pumping as necessary; backfilling and compaction; final grading; debris disposal; testing; erosion control; cleanup; and surface restoration to match or exceed existing conditions; detailed construction staking; temporary facilities; temporary fencing; clearing and grubbing; installation and subsequent removal of silt fencing and/or erosion control devices as required; connection to existing manholes or structures; fittings and connections to existing pipe; removal of existing pipe; location and verification of service laterals; granular backfill material or concrete required by trench widths exceeding the maximum allowable trench width for any pipe as shown on the Drawings; pipe anchors and cradles, and impervious ditch checks as indicated on the Drawings; abandonment or removal of existing pipe; reconnection of existing active service laterals with tee connections, piping and fittings of the correct size; removal and replacement of unsuitable pipe foundation material; street, driveway, sidewalk, curb and gutter, and pavement removal and replacement to match existing or as shown on the Drawings; fence repair and replacement; tree trimming, removal and disposal, and protection/saving; resetting and re-establishing property corners, pins, bars, or markers removed; and post-construction CCTV inspection and reports; all as shown, specified, and directed.

Contractor shall submit post-construction CCTV prior to payment. CCTV data shall be reviewed and approved by Owner/Engineer prior to payment being made.

Payment shall be per horizontal length of pipe (linear feet) actually installed as determined from the construction survey stationing. Piping shall be measured along the center line of the sewer.

E. SEWER PIPE CLEANING

ITEMS E-1 through E-9 Sewer Pipe Cleaning

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the pipe diameter and cleaning type indicated.

The unit price shall be the total cost for, but not limited to, furnishing all supervision, labor, materials, equipment, and all necessary incidentals needed to complete light or heavy cleaning as shown, specified, and directed. The unit price shall include, but not be limited to, traffic control, water for cleaning equipment, debris collection and disposal, all as shown, specified, and directed.

Payment shall be per horizontal linear feet of pipe cleaned. Cleaning length shall be measured along the center line of the sewer from manhole to manhole.

E. SEWER PIPE TELEVISIONING

ITEMs F-1 through F-9 Sewer Pipe Televising

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the pipe diameter indicated.

The unit price shall be the total cost for, but not limited to, furnishing all supervision, labor, materials, equipment, and all necessary incidentals needed to complete the CCTV as specified, and directed. The unit price shall include, but not be limited to, traffic control, water for cleaning equipment, flow control as necessary, CCTV deliverables as specified, all as shown, specified, and directed.

Payment shall be per horizontal linear feet of pipe actually televised. CCTV length shall be measured along the center line of the sewer from manhole to manhole.

G. NON-EXCAVATION REQUIRED MANHOLE REHABILITATION

ITEM G-1 Replace Manhole Frame Gasket

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal.

The unit price shall be the total cost for, but not limited to, furnishing all mobilization, supervision, testing, labor, materials, equipment, and all necessary incidentals needed to take and submit pre-construction photographs, remove the existing gasket, prepare the surface, install the new gasket, reset the existing cover, and the necessary subsidiary items listed above, as shown, specified, and directed.

Measurement for payment shall be for each new manhole frame gasket furnished and installed in place.

ITEM G-2a Replace Existing Cover with UG Standard Cover

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal.

The unit price shall be the total cost for, but not limited to, furnishing all mobilization, supervision, testing, labor, materials, equipment, and all necessary incidentals needed to take and submit pre-construction photographs, remove and salvage the existing cover, provide and

install a new UG standard cover as specified, and the necessary subsidiary items listed above, as shown, specified, and directed.

Measurement for payment shall be for each new UG standard cover furnished and installed in place.

ITEM G-2b Replace Existing Cover with UG Standard Bolt Down Cover

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal.

The unit price shall be the total cost for, but not limited to, furnishing all mobilization, supervision, testing, labor, materials, equipment, and all necessary incidentals needed to take and submit pre-construction photographs, remove and salvage the existing cover, provide and install a new UG standard bolt down cover with bolts as specified, provide and install a new frame gasket for UG standard bolt down covers, and the necessary subsidiary items listed above, as shown, specified, and directed.

Measurement for payment shall be for each new UG standard bolt down cover furnished and installed in place.

ITEM G-3 Install Flexible Liner

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal.

The unit price shall be the total cost for, but not limited to, furnishing all mobilization, supervision, testing, labor, materials, equipment, and all necessary incidentals needed to take and submit pre-construction photographs, prepare the surface, repair active infiltration, provide and install the flexible liner, perform quality control and inspection, and the necessary subsidiary items listed above, as shown, specified, and directed.

Measurement for payment shall be for each manhole that the frame seal and chimney grade adjustment is repaired with a new flexible liner.

ITEM G-4 Repair Cracks and Joints

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal.

The unit price shall be the total cost for, but not limited to, furnishing all mobilization, supervision, testing, labor, materials, equipment, and all necessary incidentals needed to take and submit pre-construction photographs, prepare the surface, repair active infiltration, repair manhole cracks and joints, perform quality control and inspection, and the necessary subsidiary items listed above, as shown, specified, and directed.

Measurement for payment shall be for each manhole that the cracks and joints are repaired.

ITEM G-5 Repair and Grout Pipe Seals

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal.

The unit price shall be the total cost for, but not limited to, furnishing all mobilization, supervision, testing, labor, materials, equipment, and all necessary incidentals needed to take and submit pre-construction photographs, prepare the surface, repair active infiltration, repair and grout the pipe seals, and the necessary subsidiary items listed above, as shown, specified, and directed.

Measurement for payment shall be for each manhole that all existing pipe seals have been repaired (regardless of the diameter of pipes entering and exiting the manhole).

ITEMS G-6a through G-6b Repair Bench and Trough

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the manhole diameter specified.

The unit price shall be the total cost for, but not limited to, furnishing all mobilization, supervision, testing, labor, materials, equipment, and all necessary incidentals needed to take and submit pre-construction photographs, prepare the surface, repair active infiltration, repair the bench and trough, and the necessary subsidiary items listed above, as shown, specified, and directed.

Measurement for payment shall be for each manhole that the bench and trough are repaired.

H. MANHOLE LINING

ITEMS H-1a through H-1c Install Cementitious Liner

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the manhole diameter specified.

The unit price shall be the total cost for, but not limited to, furnishing all mobilization, supervision, testing, labor, materials, equipment, and all necessary incidentals needed to take and submit pre-construction photographs, prepare the surface, remove manhole steps and plug step anchor holes, repair active infiltration, apply cementitious liner, perform product testing, and the necessary subsidiary items listed above, as shown, specified, and directed.

Measurement for payment shall be for each vertical foot of cementitious liner installed, measured to the nearest 0.1 vertical foot from the lowest invert to the top of the liner.

ITEMS H-2a through H-2c and H-3a through H-3c Install Epoxy Liner

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the manhole diameter specified and whether it is a new or existing manhole.

The unit price shall be the total cost for, but not limited to, furnishing all mobilization, supervision, testing, labor, materials, equipment, and all necessary incidentals needed to take and submit pre-construction photographs, prepare the surface, remove manhole steps and plug step anchor holes, repair active infiltration, apply epoxy liner to the existing manhole, perform quality control and inspection, and the necessary subsidiary items listed above, as shown, specified, and directed.

Measurement for payment shall be for each vertical foot of epoxy liner installed, measured to the nearest 0.1 vertical foot from the lowest invert to the top of the liner.

ITEMS H-4a through H-4c Install Cementitious and Epoxy Liners

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the manhole diameter specified.

The unit price shall be the total cost for, but not limited to, furnishing all mobilization, supervision, testing, labor, materials, equipment, and all necessary incidentals needed to take and submit pre-construction photographs, prepare the surface, remove manhole steps and plug step anchor holes, repair active infiltration, apply cementitious liner, perform product testing, apply epoxy liner, perform quality control and inspection, and the necessary subsidiary items listed above, as shown, specified, and directed.

Measurement for payment shall be for each vertical foot of epoxy liner installed, measured to the nearest 0.1 vertical foot from the lowest invert to the top of the liner.

ITEMS H-5a through H-5c Install OBIC Armor 1000 Aromatic Polyurea Liner

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the manhole diameter specified.

The unit price shall be the total cost for, but not limited to, furnishing all mobilization, supervision, testing, labor, materials, equipment, and all necessary incidentals needed to take and submit pre-construction photographs, prepare the surface, remove manhole steps and plug step anchor holes, repair active infiltration, apply liner, perform product testing, and the necessary subsidiary items listed above, as shown, specified, and directed.

Measurement for payment shall be for each vertical foot of cementitious liner installed, measured to the nearest 0.1 vertical foot from the lowest invert to the top of the liner.

ITEMS H-6a through H-6c and H-7a through H-7c Install Monoform Interior Liner

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the manhole diameter specified and the type of Monoform liner installed.

The unit price shall be the total cost for, but not limited to, furnishing all mobilization, supervision, testing, labor, materials, equipment, and all necessary incidentals needed to take and submit pre-construction photographs, prepare the surface, remove manhole steps and plug step anchor holes, repair active infiltration, apply liner, perform product testing, and the necessary subsidiary items listed above, as shown, specified, and directed.

Measurement for payment shall be for each vertical foot of cementitious liner installed, measured to the nearest 0.1 vertical foot from the lowest invert to the top of the liner.

I. EXCAVATION REQUIRED MANHOLE REHABILITATION

ITEM I-1a Replace Existing Frame and Cover with UG Standard Frame and Cover

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the surface condition specified.

The unit price shall be the total cost for, but not limited to, furnishing all mobilization, supervision, testing, labor, materials, equipment, and all necessary incidentals needed to take and submit pre-construction photographs, remove and salvage the existing frame and cover, provide and install a new UG standard frame and cover as specified, repair damage to existing grade adjustment and/or cone, install leveling surface, seal frame and grade adjustment/cone joints, apply joint wrap-around sleeves, and the necessary subsidiary items listed above, as shown, specified, and directed.

Measurement for payment shall be for each manhole that a new UG standard frame and cover as specified, is furnished and installed in place.

ITEM I-1b Replace Existing Frame and Cover with UG Standard Bolt Down Frame and Cover

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the surface condition specified.

The unit price shall be the total cost for, but not limited to, furnishing all mobilization, supervision, testing, labor, materials, equipment, and all necessary incidentals needed to take and submit pre-construction photographs, remove and salvage the existing frame and cover, provide

and install a new UG standard bolt down frame and cover as specified, repair damage to existing grade adjustment and/or cone, install leveling surface, seal frame and grade adjustment/cone joints, apply joint wrap-around sleeves, and the necessary subsidiary items listed above, as shown, specified, and directed.

Measurement for payment shall be for each manhole that a new UG standard bolt down frame and cover, as specified, is furnished and installed in place.

ITEM I-1c Replace Existing Frame and Cover with Polymer Frame and Cover

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the surface condition specified.

The unit price shall be the total cost for, but not limited to, furnishing all mobilization, supervision, testing, labor, materials, equipment, and all necessary incidentals needed to take and submit pre-construction photographs, remove and salvage the existing frame and cover, provide and install a new polymer frame and cover as specified, repair damage to existing grade adjustment and/or cone, install leveling surface, seal frame and grade adjustment/cone joints, apply joint wraparound sleeves, and the necessary subsidiary items listed above, as shown, specified, and directed.

Measurement for payment shall be for each manhole that a new polymer frame and cover, as specified, is furnished and installed in place.

ITEM I-2 Replace Grade Adjustment

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the surface condition specified.

The unit price shall be the total cost for, but not limited to, furnishing all mobilization, supervision, testing, labor, materials, equipment, and all necessary incidentals needed to take and submit pre-construction photographs, remove the existing frame and cover and grade adjustment, repair damage to existing cone, install leveling surface, reinstall the existing frame and cover, install new grade adjustment riser rings as specified (between 3-inches above and 12-inches below grade), seal frame and grade adjustment/cone joints, apply joint wraparound sleeves, and the necessary subsidiary items listed above, as shown, specified, and directed.

Measurement for payment shall be for each manhole that the existing frame and cover are reinstalled in place and the top elevation adjusted to grade.

ITEM I-3 Add Grade Adjustment

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the surface condition specified.

The unit price shall be the total cost for, but not limited to, furnishing all mobilization, supervision, testing, labor, materials, equipment, and all necessary incidentals needed to take and submit pre-construction photographs, remove the existing frame and cover and grade adjustment, salvage the existing frame and cover, repair damage to existing cone, install leveling surface, provide and install a new UG standard frame and cover or standard bolt down frame and cover as specified, provide and install a new frame gasket for UG standard bolt down covers, install new grade adjustment riser rings as specified (between 3-inches and 18-inches above grade), seal frame and grade adjustment/cone joints, apply joint wraparound sleeves, and the necessary subsidiary items listed above, as shown, specified, and directed.

Measurement for payment shall be for each manhole that a new UG standard frame and cover or standard bolt down frame and cover, as specified, are furnished and installed in place and the top elevation adjusted to grade.

ITEMS I-4a through I-4c Install Flattop on Existing Manhole

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the manhole diameter and surface condition specified.

The unit price shall be the total cost for, but not limited to, furnishing all mobilization, supervision, testing, labor, materials, equipment, and all necessary incidentals needed to take and submit pre-construction photographs, demolish, remove, and dispose of the existing frame and cover, grade adjustment, and cone, salvage the existing frame and cover, repair damage to existing cone, install an adequate bearing surface, provide and install a new flattop, provide and install a new UG standard frame and cover or standard bolt down frame and cover as specified, provide and install a new frame gasket for UG standard bolt down covers, install new grade adjustment riser rings as specified, seal frame and grade adjustment/cone joints, apply joint wraparound sleeves, and the necessary subsidiary items listed above, as shown, specified, and directed.

Measurement for payment shall be for each existing manhole that a new flattop, grade adjustment, and UG standard frame and cover are installed on the existing manhole.

ITEMS I-5a through I-5c Replace Existing Manhole Cone and Above

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the manhole diameter and surface condition specified.

The unit price shall be the total cost for, but not limited to, furnishing all mobilization, supervision, testing, labor, materials, equipment, and all necessary incidentals needed to take and submit pre-construction photographs, demolish, remove, and dispose of the existing frame and

cover, grade adjustment, and cone to the required elevation, salvage the existing frame and cover, install an adequate bearing surface, provide and install a new cone, provide and install a new UG standard frame and cover or standard bolt down frame and cover as specified, provide and install a new frame gasket for UG standard bolt down covers, install new grade adjustment rings as specified, seal frame and grade adjustment/cone joints, apply joint wraparound sleeves, and the necessary subsidiary items listed above, as shown, specified, and directed.

Measurement for payment shall be for each existing manhole that a new cone and above are installed on the existing manhole.

ITEMS I-6a through I-6c Replace Existing Manhole Barrel, Cone and Above

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the manhole diameter and surface condition specified.

The unit price shall be the total cost for, but not limited to, furnishing all mobilization, supervision, testing, labor, materials, equipment, and all necessary incidentals needed to take and submit pre-construction photographs, demolish, remove, and dispose of the existing frame and cover, grade adjustment, cone, and barrel to the required elevation, salvage the existing frame and cover, install an adequate bearing surface, provide and install a new cone and barrel, provide and install a new UG standard frame and cover or standard bolt down frame and cover as specified, provide and install a new frame gasket for UG standard bolt down covers, install new grade adjustment rings as specified, seal frame and grade adjustment/cone joints, apply joint wraparound sleeves, and the necessary subsidiary items listed above, as shown, specified, and directed.

Measurement for payment shall be for each vertical foot of new manhole barrel, cone, grade adjustment, and UG standard frame and cover furnished and installed in place, measured to the nearest 0.1 vertical foot from the bottom of the new barrel to the top of the frame.

ITEMS I-7a through I-7c Replace Existing Manhole with Precast Concrete Manhole (0 – 8.0 Feet Depth)

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the manhole diameter and surface condition specified.

The unit price shall be the total cost for, but not limited to, furnishing all mobilization, supervision, testing, labor, materials, equipment, and all necessary incidentals needed to take and submit pre-construction photographs, demolish, remove, and dispose of the existing manhole, cleanout, or lamphole, salvage the existing frame and cover, provide and install a new manhole, construct invert, provide necessary ladder steps, provide and install a new UG standard frame and cover or standard bolt down frame and cover as specified, provide and install a new frame gasket for UG standard bolt down covers, install new grade

adjustment rings as specified, seal frame and grade adjustment/cone joints, reconnect existing lines using pipe and flexible couplings and integral flexible manhole pipe to wall gaskets, apply joint wraparound sleeves, perform infiltration testing, and the necessary subsidiary items listed above, as shown, specified, and directed.

Measurement for payment shall be for each manhole installed, 0 to 8' in depth as indicated.

ITEMS I-8a through I-8c Replace Existing Manhole with Polymer Concrete Manhole

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the manhole diameter and surface condition specified.

The unit price shall be the total cost for, but not limited to, furnishing all mobilization, supervision, testing, labor, materials, equipment, and all necessary incidentals needed to take and submit pre-construction photographs, demolish, remove, and dispose of the existing manhole, cleanout, or lamphole, salvage the existing frame and cover, provide and install a new polymer concrete manhole, provide necessary ladder steps, provide and install a new polymer frame and cover as specified, install new grade adjustment rings as specified, seal frame and grade adjustment/cone joints, reconnect existing lines using pipe and flexible couplings and integral flexible manhole pipe to wall gaskets, apply joint wraparound sleeves, perform infiltration testing, and the necessary subsidiary items listed above, as shown, specified, and directed.

Measurement for payment shall be for each polymer manhole installed, 0 to 8' in depth, as indicated.

ITEMS I-9a through I-9c Install Precast Concrete Manhole Extra Depth

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the manhole diameter and surface condition specified for extra depth of wall for manholes greater than the standard manhole depth (measured as described in Item I-7).

The unit price shall be the total cost for, but not limited to, furnishing all mobilization, supervision, testing, labor, materials, equipment, and all necessary incidentals needed to provide and install additional manhole wall depth, provide necessary ladder steps, reconnect existing lines using pipe and flexible couplings and integral flexible manhole pipe to wall gaskets, apply joint wraparound sleeves, perform infiltration testing, and the necessary subsidiary items listed above, as shown, specified, and directed.

Measurement for payment shall be for each vertical foot in excess of the standard manhole depth (measured as described in Item I-7), measured to the nearest 0.1 vertical foot.

ITEMS I-10a through I-10c Install Polymer Concrete Manhole Extra Depth

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the manhole diameter and surface condition specified for extra depth of wall for manholes greater than the standard manhole depth (measured as described in Item I-8).

The unit price shall be the total cost for, but not limited to, furnishing all mobilization, supervision, testing, labor, materials, equipment, and all necessary incidentals needed to provide and install additional manhole wall depth, provide necessary ladder steps, reconnect existing lines using pipe and flexible couplings and integral flexible manhole pipe to wall gaskets, apply joint wraparound sleeves, perform infiltration testing, and the necessary subsidiary items listed above, as shown, specified, and directed.

Measurement for payment shall be for each vertical foot in excess of the standard manhole depth (measured as described in Item I-8), measured to the nearest 0.1 vertical foot.

ITEM I-11 Replace Existing Inlet with Precast Concrete Inlet (5' x 3', 0 to 8 Feet Depth)

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the inlet replacement specified.

The unit price shall be the total cost for, but not limited to, furnishing all mobilization, supervision, testing, labor, materials, equipment, and all necessary incidentals needed to take and submit pre-construction photographs, demolish, remove, and dispose of the existing inlet, salvage the existing frame and cover, provide and install a new inlet, construct invert, provide necessary ladder steps, provide and install a new UG standard frame and cover or standard bolt down frame and cover as specified, provide and install a new frame gasket for UG standard bolt down covers, reconnect existing lines using pipe and flexible couplings and integral flexible manhole pipe to wall gaskets, and the necessary subsidiary items listed above, as shown, specified, and directed.

Measurement for payment shall be for each inlet installed, 0 to 8 feet in depth as indicated.

J. MISCELLANEOUS CONSTRUCTION

ITEMS J-1a through J-1b Install Inside Drop Bowl, Fittings, and Piping

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the drop pipe diameter specified.

The unit price shall be the total cost for, but not limited to, furnishing all mobilization, supervision, testing, labor, materials, equipment, and all necessary incidentals needed to take and submit pre-construction photographs, install drop bowl, anchor bolts, clamp and brackets, pinch

bolt and nuts, drop pipe, fittings, and the necessary subsidiary items listed above, as shown, specified, and directed.

Measurement for payment shall be for each inside drop installed.

ITEM J-2 Repair Cave-In

Payment for this item(s) shall be in accordance with the lump sum price set forth in the Contractor's proposal.

The lump sum price shall be the total cost for, but not limited to, furnishing all supervision, labor, materials, equipment, and all necessary incidentals needed to fill the cave-in site and restore the surface to match existing conditions as shown, specified, and directed. The lump sum price shall include, but not limited to, traffic control, safety equipment, site preparation and excavation; saw cutting of existing pavement; existing utility removal, replacement, or relocation; disposal of excavated material not used for backfill; dewatering as necessary; backfilling and compaction; final grading; granular fill material; flowable fill backfill material in pavement, fence repair or replacement; tree removal and saving; final grading; installation of top soil; installation of sub base and pavement replacement in streets, driveways, and sidewalks; debris disposal; testing; erosion control; cleanup; and surface restoration to match or exceed existing conditions; all as shown, specified, and directed.

Payment shall be for each cave-in site repaired and restored to match existing conditions.

ITEMS J-3a through J-3c Mow Easement for Site Access

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the corridor width specified.

The unit price shall be the total cost for, but not limited to, furnishing all supervision, labor, materials, equipment, and all necessary incidentals needed to cut existing surface vegetation to a 6-inch depth for the entire width of the existing permanent sewer easement. Contractor shall assume sewer pipe is centered in the easement. The unit price shall include, but not limited to, traffic control; safety equipment; surface restoration to match or exceed existing conditions if area becomes rutted due to weather conditions; all as shown, specified, and directed. Payment shall be for each linear foot of area mowed to the width required.

Payment shall be per horizontal linear feet of area mowed over the existing pipe.

ITEMS J-4a through J-4c Clear Easement for Site Access

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the corridor width specified.

The unit price shall be the total cost for, but not limited to, furnishing all supervision, labor, materials, equipment, and all necessary incidentals needed to clear existing surface vegetation and trees up to and including 6" diameter for the entire width of the existing permanent sewer easement. Contractor shall assume sewer pipe is centered in the easement. Tree diameter shall be measured 2' above the surrounding ground surface. The unit price shall include, but not limited to, traffic control; safety equipment; removal of all vegetative matter; disposal of all vegetative matter; removal and replacement of fences; moving surface features that can be removed and replaced; surface restoration to match or exceed existing conditions if area becomes rutted due to weather conditions; all as shown, specified, and directed. Payment shall be for each linear foot of area cleared to the width required.

Payment shall be per horizontal linear feet of area cleared over the existing pipe.

ITEMS J-5a through J-5d Remove Trees for Site Access

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the tree diameter specified.

The unit price shall be the total cost for, but not limited to, furnishing all supervision, labor, materials, equipment, and all necessary incidentals needed to remove each tree. Tree diameter shall be measured 2' above the surrounding ground surface. Trees shall only be removed from November 1 to March 31. The unit price shall include, but not limited to, traffic control; safety equipment; removal of the tree complete down to ground surface; disposal of all vegetative matter; surface restoration to match or exceed existing conditions if area becomes rutted due to weather conditions; all as shown, specified, and directed.

Payment shall be for each tree removed.

K. HOURLY WORK – LABOR

ITEMS K-1 through K-9 Hourly Work - Labor

The unit costs set forth in the Contractor's proposal for Hourly Work shall be used as compensation for work identified in writing by the Owner which does not meet the description of other items for which the Contractor has provided a bid price. The work will be paid on a time and materials basis. The Contractor will have a 24-hour emergency response time and the pricing on Table K will be good for such occasions.

L. HOURLY WORK – EQUIPMENT

ITEMS L-1 through L-6 Hourly Work - Equipment

The unit costs set forth in the Contractor's proposal for Hourly Work shall be used as compensation for work identified in writing by the Owner which does not meet the description of other items for which the Contractor has provided a bid price. The work will be paid on a time and materials basis. The Contractor will have a 24-hour emergency response time and the pricing on Table L will be good for such occasions.

M. DITCH INSTALLATION

ITEMS M-1 through M-6 Install Ditch

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the slope, ditch depth, and ditch shape specified.

The unit price shall be the total cost for, but not limited to, furnishing all supervision, labor, materials, equipment, and all necessary incidentals needed to install the ditch as shown, specified, and directed. The unit price shall include, but not be limited to, take and submit pre-construction photographs; traffic control; safety equipment; site preparation and excavation; existing utility removal, replacement, or relocation; disposal of excavated material not used; final grading; debris disposal; erosion control; cleanup; and surface restoration to match or exceed existing conditions; detailed construction staking; temporary facilities; clearing and grubbing; installation and subsequent removal of silt fencing and/or erosion control devices as required; all as shown, specified, and directed.

Payment shall be per horizontal length of ditch (linear feet) actually installed as determined from the construction survey stationing.

N. DITCH RESTORATION

ITEMS N-1a through N-1c Install Nyloplast Drain Basin

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the drain basin diameter and depth specified.

The unit price shall be the total cost for, but not limited to, furnishing all mobilization, supervision, testing, labor, materials, equipment, and all necessary incidentals needed to take and submit pre-construction photographs, install the drain basin, make necessary pipe connections, and the necessary subsidiary items listed above, as shown, specified, and directed.

Measurement for payment shall be for each drain basin installed as indicated.

ITEMS N-2a through N-2c and N-3a and N-3c Restore Ditch Cross-Section

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the ditch depth and ditch shape specified.

The unit price shall be the total cost for, but not limited to, furnishing all supervision, labor, materials, equipment, and all necessary incidentals needed to install the ditch as shown, specified, and directed. The unit price shall include, but not be limited to, take and submit pre-construction photographs; traffic control; safety equipment; site preparation and excavation; existing utility removal, replacement, or relocation; disposal of excavated material not used; final grading; debris disposal; erosion control; cleanup; and surface restoration to match or exceed existing conditions; detailed construction staking; temporary facilities; clearing and grubbing; installation and subsequent removal of silt fencing and/or erosion control devices as required; all as shown, specified, and directed.

Payment shall be per horizontal length of ditch (linear feet) actually restored as determined from the construction survey stationing.

O. CULVERT INSTALLATION

ITEMS O-1 through O-12 Install Culvert

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the culvert diameter, culvert depth, culvert material, and surface condition specified.

The unit price shall be the total cost for, but not limited to, furnishing all supervision, labor, materials, equipment, and all necessary incidentals needed to install culvert as shown, specified, and directed. The unit price shall include, but not be limited to, take and submit pre-construction photographs; traffic control; safety equipment; site preparation and excavation; existing utility removal, replacement, or relocation; disposal of excavated material not used for backfill; dewatering/bypass pumping as necessary; backfilling and compaction; final grading; debris disposal; testing; erosion control; cleanup; and surface restoration to match or exceed existing conditions; detailed construction staking; temporary facilities; temporary fencing; clearing and grubbing; installation and subsequent removal of silt fencing and/or erosion control devices as required; abandonment or removal of existing culvert; removal and replacement of unsuitable pipe foundation material; street, driveway, sidewalk, curb and gutter, and pavement removal and replacement to match existing or as shown on the Drawings; fence repair and replacement; tree trimming, removal and disposal, and

protection/saving; and post-construction CCTV inspection and reports; all as shown, specified, and directed.

Contractor shall submit post-construction CCTV prior to payment. CCTV data shall be reviewed and approved by Owner/Engineer prior to payment being made.

Payment shall be per horizontal length of culvert (linear feet) actually installed as determined from the construction survey stationing.

P. CULVERT CLEANING

ITEMS P-1 through P-9 Culvert Cleaning

Payment for this item(s) shall be in accordance with the unit price set forth in the Contractor's proposal for the culvert diameter and cleaning type indicated.

The unit price shall be the total cost for, but not limited to, furnishing all supervision, labor, materials, equipment, and all necessary incidentals needed to complete light or heavy cleaning as shown, specified, and directed. The unit price shall include, but not be limited to, traffic control, water for cleaning equipment, debris collection and disposal, and post-cleaning culvert televising, all as shown, specified, and directed.

Payment shall be per horizontal linear feet of culvert cleaned. Cleaning length shall be measured along the center line of the culvert from end to end.

1.02 Rehabilitation Schedules

1. Existing conditions on the Rehabilitation Schedules, including manhole and pipe depths, diameters, and materials; pipe lengths; and point repair locations; are from previous inspection efforts and/or sewer records and have not been field verified or surveyed. Contractor shall field inspect and verify existing conditions as necessary to perform the Work.

1.03 Technical Data

1. An online GIS Site Map and Dashboard showing the location of the sewer pipe and manhole repairs identified in the Rehabilitation Schedules will be provided to the Contractor.
 - a. The GIS Site Map and Dashboard may be accessed using a standard internet browser. Contact Tanner Stark, Unified Government, at 913-573-1383 for any access issues or concerns.
 - b. The GIS Site Map and Dashboard has filter, zoom, and search capabilities and other GIS data layers are available to view.
 - c. An electronic GIS shapefile of the online GIS Site Map is also available for download using the menu at the top right of the GIS Site Map and Dashboard.

- d. Location of existing main sanitary sewers, storm sewers, and water lines shown on the GIS Site Map was obtained from the Unified Government GIS. Indicated scale is approximate; do not scale. The locations shown are believed to be reasonably correct, but do not purport to be absolutely so.
 - e. Location of existing right-of-way/property lines shown on the GIS Site Map was obtained from the Unified Government GIS. The locations shown are believed to be reasonably correct, but do not purport to be absolutely so.
 - f. Manholes identified to be **Rehabilitated** on the GIS Site Map include work specified as:
 - i. Non-Excavation Required Manhole Rehabilitation,
 - ii. Manhole Lining,
 - iii. Excavation Required Manhole Rehabilitation, and/or
 - iv. Miscellaneous Construction in the Sanitary Manhole and Storm Manhole and Structure Rehabilitation Schedules.
 - g. Manholes identified to be **Replaced/Installed** on the GIS Site Map include work specified as:
 - i. Install Flattop on Existing Manhole,
 - ii. Replace Existing Manhole Cone and Above,
 - iii. Replace Existing Manhole Barrel, Cone and Above, or
 - iv. Replace Existing Manhole in the Sanitary Manhole and Storm Manhole and Structure Rehabilitation Schedules.
2. In preparation of the Contract Documents, the following information regarding existing sewers and manholes were used:
- a. Internal manhole inspection videos. Available internal manhole inspection videos may be viewed at the Unified Government, 61 Market Street. Call 913-573-1360 to schedule an appointment.
 - b. Internal CCTV inspection videos. Available, individual internal CCTV inspection videos may be viewed at the Unified Government, 61 Market Street. Call 913-573-1360 to schedule an appointment.
3. The online GIS Site Map and Dashboard and information regarding existing sewers and manholes detailed above shall be considered technical data upon which Contractor may rely. It shall be understood that the information provided is not guaranteed by Owner or Engineer to be more than a general indication of the physical conditions likely to be found.
4. Contractor may rely upon the general accuracy of the “technical data” contained in such inspections and maps, but such inspections and maps are not Contract Documents. Except for such reliance on such “technical data,” Contractor may not rely upon or make any Claim against Owner, Engineer, or any of Engineer’s Consultants with respect to:
- a. 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
 - b. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 - c. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.
5. Responsibility for differing site conditions shall be determined in accordance with the Clause in the Invitation for Bids entitled "Differing Site Conditions" (Section 16 - General Conditions).

6. No other reports of explorations and tests or drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site are available.

1.04 Construction

1. No effort has been made by the Engineer to locate existing utilities. Before starting Work, the Contractor shall notify all utilities involved, and shall request them for cooperation effort to avoid breaking utility lines. The utility shall be notified immediately should a break occur in a line during construction under this contract. Any lines so broken by the Contractor shall be repaired according to the utility company's standards at the expense of the Contractor.
2. Contractor shall be held responsible for contacting all utility companies for field location of all underground utility lines, whether shown on the GIS Site Map or not, prior to any excavation.
3. Contractor shall provide protection to prevent undermining or damage to the structural integrity of all utility poles, fences, road signs, or other items that parallel or cross the site and make arrangements with owning entity to provide temporary support or protection during construction.
4. Existing private sanitary sewer facilities serving buildings may not be shown. Contractor shall be held responsible for any damages done to these facilities during construction, and shall maintain continuous service to all buildings.
5. Contractor shall verify location, material, and diameter of existing service laterals and connections prior to construction. Provide fittings and materials, including reducers, as necessary to make necessary connections.
6. Contractor shall be responsible for verifying the location of all active service connections. Only active service connections shall be reinstated.
7. It shall be the responsibility of the Contractor to see that no water, silt, or foreign material enters the lines of the existing sanitary sewer to which these sewers are connected.
8. Blasting shall not be allowed to complete any of the work detailed on the Rehabilitation Schedules.
9. Construction activity (including demolition, clearing, storage of equipment and materials, installation of materials and equipment, and employee parking) shall be restricted to street right-of-way and Unified Government-owned property, along with other areas secured by Contractor by private agreement. If necessary to perform proposed Work, Contractor shall negotiate access agreements with property owners. Engineer shall be informed of Contractor's private arrangements for construction access and shall be supplied a copy of the written agreement(s).
10. Flow in existing sanitary mains and service lines shall be maintained at all times and shall not be discharged to the environment.
11. Contractor shall utilize Best Management Practices to control erosion and sediment migration into storm drainage structures or channels. Contractor shall evaluate drainage patterns and provide erosion control devices as necessary. All costs associated with providing erosion control devices shall be considered subsidiary to the payment items provided on the Bid Form.
12. Contractor shall restore the project sites to conditions equal to or better than those existing prior to entry. All existing items and construction removed or damaged during the performance of the Work, regardless of location and whether or not indicated on these Rehabilitation Schedules, shall be repaired or replaced as detailed in the Contract Documents unless otherwise indicated on these Rehabilitation Schedules.

PART 2 - PRODUCTS - NOT APPLICABLE

PART 3 - EXECUTION - NOT APPLICABLE

END OF SECTION 1100

DIVISION 33 UTILITIES

SECTION 1400 - PROJECT INTERNAL TELEVISION INSPECTION

PART 1 - GENERAL

1.01 WORK INCLUDED IN THIS SECTION

- A. This Section governs closed circuit televising and concurrent video recording of the main sewer line segments. The Contractor shall provide the Owner with a high-quality internal color video recording showing both the pre- and post-construction conditions, including the restored service connections.
- B. Pre-construction internal CCTV inspection shall be completed for all existing sanitary and storm sewer lines scheduled for replacement (open cut excavation and pipe bursting/reaming), point repairs, and CIPP rehabilitation. Pre-construction internal CCTV inspection for lines scheduled for both point repairs and CIPP shall be performed prior to construction of the point repair.
- C. Completed pre-construction internal CCTV inspection recordings shall be reviewed and accepted by the Engineer prior to construction.
- D. Post-construction internal CCTV inspection shall be completed for all sanitary and storm sewer lines installed/rehabilitated/replaced by open cut excavation and pipe bursting/reaming, point repairs, and CIPP rehabilitation. Post-construction internal CCTV inspection for lines with both point repairs and CIPP shall be performed after the CIPP work has been completed.
- E. The CCTV inspection shall be completed from manhole/structure to manhole/structure.
- F. Contractor shall provide and have on site, heavy cleaning and root cutting equipment for use during CCTV inspection. Contractor shall include the cost for heavy cleaning and root cutting in their bid proposal.

1.02 REVISIONS OF STANDARDS

- A. When reference is made to a Standard Specification i.e. ASTM, ANSI, AWWA, MCIB, the Specification referred to shall be understood to mean the latest revision of said specification as amended at the time of the Notice to Bidders, except as noted on the Drawings.

1.03 SUBMITTALS

- A. The Contractor shall provide certifications or shop drawings on all materials provided under these specifications in accordance with the General Requirements.

1.04 QUALITY ASSURANCE:

- A. The project internal video shall be performed by a qualified commercial or individual company who is familiar with television inspection equipment and is PACP (Pipeline Assessment Certification Program) certified by NASSCO (National Association of Sewer Service Companies).

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 PROJECT VIDEO RECORDING:

- A. A high-quality project video recording of existing internal conditions shall be created and updated by the Contractor prior to beginning construction and after construction is complete. The pre- and post-construction videos shall conform with PACP standards. The following locational information shall be provided on color audio-video tape recordings:
- B. Audio: Each recording shall begin with a verbal description of the current date, project name and municipality and be followed by the site number, general location, i.e. project street address, upstream and downstream manhole and direction of progress. Audio should also include location of all pipe defects and conditions, and service connections. The project location shall be the location of the upstream manhole.
- C. Video: Transparent information must appear on the viewing screen at all times. This information shall contain the site number, upstream manhole number, downstream manhole number, month, day, year, and continuous footage. All pipe conditions and service connections shall be noted at the appropriate locations.
- D. All video files shall be properly named in accordance with Owner's methodology and provided on an easily accessible cloud-based data storage system. The cloud-based data storage system shall be accessible to the Owner for a minimum of three years. Data storage site shall not limit the number of Owner staff to have access.
- E. Any portion of the video recording not conforming to specifications shall be rejected.
- F. All video shall be provided to the Owner on an electronic storage medium with a Moving Pictures Expert Group (.mp4) format. Each line segment shall be recorded on a separate file with the upstream and downstream manhole numbers in the file name.
- G. Allowable Flow Depth: When depth of flow in the upstream manhole of the line segment being inspected is above the maximum allowable level for television inspection, the flow shall be reduced. The depth of flow shall not exceed the levels shown below for the respective pipe sizes, as measured in the manhole at the time of inspection:

<u>Pipe Dia. (inches)</u>	<u>Max Flow Depth (% of Dia.)</u>
≤ 10	20
12 - 24	25
≥ 27	30

- H. Remote Inspection. Television inspection shall be done one line segment at a time. The inspection shall proceed from one manhole to another starting either upstream or downstream and completing in that order for the entire line. When an obstruction prevents the camera from passing through the entire segment, the inspection shall be continued from the opposite manhole before proceeding to the next segment.
- I. The camera shall be moved through the line at a moderate rate, stopping when necessary to permit proper documentation of the sewer's condition. In no case shall the camera be pulled at a rate greater than thirty feet (30') per minute. The camera shall be moved through the line by conventional means of manual winches, power winches, or transporter units with tracks which do not obstruct camera view or interfere with proper documentation of the sewer conditions. In instances where manual or remote power winches are used to pull the camera through the sewer, constant two-way communication shall be set up between the two manholes of the line being inspected. The camera shall pause as it approaches a service so that the connection between the pipe and the service can be evaluated. The lens shall then rotate to display the interior of the service. The service inspection should identify any visible roots, cracks, or capped risers.

3.02 TELEVISION INSPECTION EQUIPMENT:

- A. Television Inspection Equipment. Inspection of sewer line segments shall be performed using color camera units specifically designed and constructed for the method of inspection performed. Skids or tracks attached to the camera unit shall be designed for the size of pipe being televised. Units shall have either an automatic or remote focus and iris controls, and the complete systems shall be operable in conditions of one hundred percent (100%) humidity.
- B. A Pan and Tilt viewing camera with the ability to view into the service laterals shall be used for 8" sewer lines and larger. A mini-camera may be utilized where necessary if the 8" camera setup is blocked. Each service lateral or tap shall be inspected to determine operational status and condition of the piping at the mainline connection. The Pan and Tilt viewing camera shall have a three hundred and sixty degree (360 degree) vertical rotation and a two hundred and seventy degree (270 degree) horizontal rotation.
- C. Lighting shall be suitable to allow a clear picture of the entire periphery of the main sewer pipe. Lighting shall operate in a manner that allows the viewed object to be illuminated no matter what angle of the camera lens. The lighting shall be built into the unit so that the lamps remain aligned with the lens. A minimum illumination of three (3) lux with a light color in the twenty-two hundred to thirty-two hundred degree Kelvin (2200 degree – 3200 degree K) range shall be provided.
- D. The Contractor shall have the necessary camera skids, floats, and rafts available to allow inspection of lines in a manner acceptable to the Engineer under live flow conditions. The complete video system (camera, lens, lighting, cables, monitors and recorders) shall be capable of producing a picture quality acceptable to the Engineer, and if unsatisfactory, the equipment shall be removed and no payment shall be made for unsatisfactory inspections.
- E. Blowers shall be used to clear suspended moisture or fog in pipes prior to inspection.

3.03 DELIVERABLES

- A. Prior to initiating field work, Unified Government will provide the Contractor with a Project Tracking Spreadsheet that includes each pipe to be inspected as part of the project. The upstream and downstream manholes numbers and certain pipe characteristics will be provided. The deliverables described below shall be submitted by the Contractor.
- B. Prior to the first invoice, the Contractor shall coordinate with the Unified Government Project Manager to determine the appropriate PACP Export Version to use on this project and the Contractor will submit an electronic sample of each deliverable to the Unified Government Project Manager for approval. The sample shall include at least two inspections. The intent of this deliverable is to resolve data collection formatting issues early in the project execution process. The Unified Government Project Manager and Unified Government IT Representatives will review the submittal and coordinate resolution of data format issues with the Contractor.
- C. With each invoice, the Contractor shall upload the Video Files, Condition Reports, and the Project Tracking Spreadsheet updated to reflect each pipe invoiced to date on the project to the cloud-based data storage system. The Condition Report shall include the Owner name, street address, site number, upstream and downstream manhole numbers, date, time, location of defects and conditions, service connections, and any other relevant data. pipe attributes, and observations coded. The Project Tracking Spreadsheet shall indicate which inspections are complete to date and any pipe characteristics where the observed value differs from the value provided. A folder shall be created for each pipe inspected. The folder shall be named based on a concatenation of the upstream and downstream manhole numbers. If the inspection work is associated with construction work, a second level of the folder structure should indicate whether the inspection occurred before or after construction. The Video File and Condition

Report should be organized into this folder structure. The Project Tracking Spreadsheet shall be placed at the root level of the folder structure (i.e., not placed in any folder).

- D. At the end of the project, the Contractor shall upload a single PACP Export database and the associated Video Files that can be imported into Unified Government's inspection database of record to the cloud-based data storage system. This submittal shall include all inspections associated with the project including pre-construction and post- construction inspections.

3.04 QUALITY

- A. Any video recording not acceptable to the Owner shall be re-televised (start to finish) at no additional charge to the Owner. The Contractor shall reschedule unacceptable coverage within five (5) days after being notified.

END OF SECTION 1400

SECTION 2532 - MANHOLE AND STRUCTURE INTERIOR COATINGS

PART 1 - GENERAL

1.01 WORK INCLUDED IN THIS SECTION

- A. This section governs the furnishing of all labor, equipment, tools, and materials, and the performance of all work incidental to the rehabilitation/lining of manholes and special sewer structures including cleaning the entire interior surface of the structure and preparation (plugging/patching) of the concrete structure's interior surface for lining.

1.02 SPECIFICATION MODIFICATIONS

- A. It is understood that throughout this section these Specifications may be modified by appropriate items in the notes on the Contract Drawings.

1.03 REVISIONS OF STANDARDS

- A. When reference is made to a Standard Specification i.e. ASTM, ANSI, AWWA, MCIB, the Specification referred to shall be understood to mean the latest revision of said specification as amended at the time of the Notice to Bidders, except as noted on the Drawings.

1.04 SUBMITTALS

- A. The Contractor shall provide certifications or shop drawings on all materials provided under these specifications in accordance with the General Requirements.

1.05 QUALIFICATIONS

- A. The Contractor shall be certified by the manufacturer of the particular coating/lining that said company is a fully trained user of the application equipment. Personnel directly involved shall receive training in the proper methods for handling and installing the lining/coating. Training shall be performed by a qualified representative. Copies of the certificates provided by the manufacturer to the Contractor and installation personnel shall be provided to the Unified Government.
- B. The contractor and the contractor's staff shall have experience installing manhole cementitious liner and epoxy liner, with a minimum installation of 15,000 vertical feet of cementitious liner and 15,000 vertical feet of epoxy liner. Documentation of experience shall be provided to the Unified Government.

PART 2 - PRODUCTS

2.01 INTERIOR LINER

The internal surface of a manhole shall be coated, as noted on the Drawings, with one of the following.

- A. Cementitious Liner: Manhole liners under this part shall apply to eliminating infiltration, providing corrosion protection, repair of voids, and restoration of the structural integrity of the substrate. The materials, mixing ratios, and procedures utilized for the lining process shall be in accordance with the manufacturer's recommendations. The

applicator shall be approved and trained by the manufacturer of the lining system materials. The product shall be manufactured by Strong-Seal Systems, Corp., Pine Bluff, Arkansas; Quadex Inc., North Little Rock, Arkansas; or approved equal.

1. Patching Material

- a. A quick setting corrosion resistant cementitious material shall be used as a patching material, and is to be mixed and applied according to manufacturer's recommendations, and shall have the following minimum requirements:

- (1) Compressive Strength: ASTM C579B, 1,400 psi, 6 hrs.
- (2) Bond: ASTM C321, 1,000 psi, 24 hrs.
- (3) Applied Density: 120 lbs $\pm$ 5 lbs pcf
- (4) Shrinkage: ASTM C157, 0% at 90% R.H.

2. Infiltration Control Material

- a. A rapid setting cementitious product, specifically formulated for leak control, shall be used to stop minor water infiltration, shall be mixed and applied according to manufacturer's recommendations and shall have the following minimum requirements:

- (1) Compressive Strength: ASTM C579B, 600 psi, 1 hr., 1,000 psi, 24 hrs.
- (2) Bond: ASTM C321, 30 psi, 1hr., 80 psi, 24 hrs.

3. Grouting Material

- a. A cementitious grout shall be used for stopping very active infiltration and filling voids, and shall be mixed and applied according to manufacturer's recommendations. The cementitious grout shall be volume stable, and have a minimum twenty-eight (28) day compressive strength of 250 psi and a one (1) day compressive strength of 50 psi.
- b. A cementitious grout designed for special soil conditions, and shall be used per manufacturer's recommendations. The cementitious grout shall be volume stable, and have a minimum twenty-eight (28) day compressive strength of 1,000 psi.
- c. Chemical grouts that result in a final gel matrix may be used for stopping very active infiltration and shall be mixed and applied per manufacturer's recommendations.

4. Liner Material

- a. A cementitious product shall be used to form a structural/structurally enhanced monolithic liner covering all interior substrate surfaces. The liner material shall be applied with machinery specially designed for the application, and shall have the following minimum requirements at twenty-eight (28) days:

- (1) Compressive Strength: ASTM C495, >3,000 psi
- (2) Tensile Strength: ASTM C496, >300 psi
- (3) Flexural Strength: ASTM C293, >600 psi
- (4) Shrinkage @ 90% R.H.: ASTM C596, 0%
- (5) Bond: ASTM C321, >130 psi
- (6) Density, when applied: 105 pcf

- b. Liner material shall be one of the following products:

- (1) Strong-Seal ® MS-2A shall be made with Type I or Type III Portland Cement and shall be used according to manufacturer's recommendations in applications where there is no, or very mild, sulfide conditions (pH 3.0 or higher).

- (2) Strong-Seal ® MS-2C or Quadex Aluminaliner shall be made with Calcium Aluminate Cement and shall be used according to manufacturer's recommendations in applications where there is evidence of severe sulfide conditions (pH 2.0 or higher).
 - (3) Strong-Seal ® Sewpercoat ® PG or Quadex Approved Equal shall be used in applications where harsh hydrogen sulfide conditions regardless of surface pH, as long as environment is in a municipal sanitary system.
- B. Epoxy Liner: The epoxy manhole liner shall be chemical resistant (below a pH of 2.0), VOC compliant, moisture tolerant, 100% solids, two (2) component epoxy system with the following properties:
1. Flexural Strength [ASTM D790]: > 10,000 psi
 2. Compressive Strength [ASTM D695]: > 10,000 psi
 3. Tensile Strength [ASTM D638]: > 7,000 psi
 4. Adhesion: Concrete Substrate Failure
 5. Abrasion Resistance [Tabor Coefficient, ASTM D4060]: < 95 mg loss
- C. Polyurea Liner: The polyurea manhole liner shall be a chemical resistant (below a pH of 2.0), VOC compliant, moisture tolerant, 100% solids, two (2) component polyurea system with the following properties:
1. Tensile Strength [ASTM D412]: 3315 psi
 2. Ultimate Elongation [ASTM D412]: 395%
 3. Durometer Hardness, Shore D [ASTM D2240]: 48
 4. Tear Strength [ASTM D624]: 417 psi
- D. Flexible Liner: The flexible liner shall be a specially-formulated polyurea or fiber-reinforced, asphalt-modified urethane material designed to prevent infiltration between the manhole frame and chimney and manhole cone, wall and bench joints. The liner shall show no signs of damage from freeze/thaw cycles and have extremely low water absorption. The physical properties shall be as follows:
1. Tensile Strength [ASTM D638]: 54 psi
 2. Tensile Elongation [ASTM D638]: 126%
 3. Durometer Hardness, Shore D [ASTM D2240]: 48
 4. Adhesion [ASTM D4551]: > 350 psi
 5. Tear Strength [ASTM D624]: 525 psi
 6. Water Absorption [ASTMD570]: 0.05%
 7. Freeze/Thaw [ASTM C666]: 100 cycles no visible damage
 8. Temperature Service Range: -20°F to +250°F

PART 3 - EXECUTION

3.01 CEMENTITIOUS LINER

Repair of existing manholes by installing a cementitious lining shall consist of: 1) cleaning the entire manhole interior surface; 2) removal of any existing steps; 3) preparation (plugging/patching) of the manhole interior surface for lining including repair of frame seal, grade adjustment, cone/wall joint, pipe seals and bench and invert as required to prepare manhole for lining; and 4) lining the entire manhole interior surface with a structural/structurally enhanced monolithic liner.

- A. Cleaning: Prior to cleaning, covers shall be placed over the flow channels to prevent extraneous material from entering the sewer lines. Cleaning shall consist of completely removing loose bricks and mortar, unsound concrete, bricks, grease, roots, mud and debris from the interior surface of the manhole to a depth necessary to expose a sound sub-base. All roots shall be cut flush with the manhole wall. The entire interior surface of the manhole shall be cleaned using a high pressure (minimum of 2,000 psi) water (potable) spray.
- B. Preparation for Manhole Lining
1. After cleaning, the manhole interior surface shall be prepared for lining. Loose or missing brick shall be removed and replaced, actively leaking areas plugged, and voids patched. Any patching and/or plugging materials shall be deemed compatible with the lining material used for lining the manhole as determined by the manufacturers. Manhole steps are to be removed from the manhole and their anchor holes plugged utilizing patching material as defined in Specification 2532. Manhole steps are to be removed from the jobsite and disposed of properly. It shall not be acceptable to leave manhole steps which have been removed in the manhole, and any backups caused by such practices will be remediated at the expense of the Contractor.
 2. The manufacturer of the cementitious liner shall provide the Contractor recommendations for methods and materials to plug actively leaking areas. Holes (including holes left after removing steps), voids, and cracks shall be patched with cement patch conforming to the manufacturer's instructions. Contractor shall follow all manufacturer instructions during the course of the Work.
 3. Prior to lining brick manholes, the stair stepped brick surface on the underside of the cones shall be filled in with cementitious liner to create a uniform sloped surface on which to apply the cementitious liner.
 4. Any bench, invert, pipe seal with roots, visible damage and/or extraneous water leakage shall be repaired prior to installation of cementitious liner.
- C. Manhole Sealing - Cement Manhole Liner
1. Application (spraying) of the lining material shall be done in accordance with the manufacturer's recommendations. The entire manhole interior surface shall be clean and free of foreign material, and damp without noticeable free water droplets or running water, but totally saturated. The manhole bench and invert shall be covered with plywood, and the material spray applied from the bottom of the wall to the top of the manhole to form a coating of uniform thickness sufficient to ensure that all cracks, crevices, and voids are filled and a relatively smooth hand troweled surface remains.
 2. The thickness of the lining material shall not be less than one (1") inch thick at any point from the wall/bench joint to the bottom of the frame.
 3. After application of the manhole lining material, the plywood covers shall be removed from the flow channels and the bench sprayed in such a manner to produce a bench having a gradual slope from the wall/bench intersection to the edge of the rim of the trough (flow channel). Material at the wall/bench intersection shall be built up and rounded to produce a uniform radius at the circumference of the intersection.
 4. The thickness of lining material shall be no less than 1-inch on the bench at the rim of the trough, and shall increase in the direction of the wall to provide the required slope.

- D. Equipment: Equipment used to mix and apply the lining material shall meet the requirements and specifications of the manufacturer.
- E. Mixing: Mixing of the lining material shall be done in accordance with requirements and specifications of the manufacturer.
- F. Curing: Curing of the applied lining material shall be done in accordance with the manufacturer's recommendations. Sufficient cure time shall be provided prior to subjecting the applied liner to active flow. Traffic shall not be allowed over substrates until sufficient cure time has elapsed.
- G. Weather: No application shall be made to frozen surfaces, or if freezing is expected to occur inside the substrate within 24 hours after the application. Specific recommendations and field methods approved by the manufacturer shall be followed for applying lining material when ambient temperatures are less than 45° F or in excess of 95° F.
- H. Product Testing: Four (4) 2-inch cubes shall be cast each day, or from every 50 bags of product used, and shall be properly labeled and sent to the manufacturer for testing in accordance with the manufacturer's directions, for compressive strength testing as described in ASTM C109.

3.02 EPOXY AND POLYUREA MANHOLE LINER

Installation of epoxy and polyurea liner shall consist of: cleaning the entire interior surface of the structure; preparation (plugging/patching) of the concrete structure's interior surface for lining; installation of the cementitious liner, where required to create a smooth surface for installation of the epoxy liner; and lining the concrete structure's interior surface with a single coat of a two component, 100% solids epoxy or polyurea coating system which provides a durable, high strength, monolithic lining, at an average thickness of 175 mils with a minimum thickness of 165 mils.

- A. Cleaning: Prior to cleaning, covers shall be placed over the flow channels to prevent extraneous material from entering the flow stream. Cleaning shall consist of completely removing loose materials, unsound concrete, grease, mud and debris from the interior surface of the structure to a depth necessary to expose a sound subbase. Remove dust, laitance, grease, paint, form release agents or any other surface contaminants using a power washer as defined herein. Patching/plugging manhole defects as necessary to provide a smooth surface for application of the epoxy liner. The entire interior surface of the structure shall be cleaned using a high pressure (minimum of 3000 psi) water (potable) spray.
- B. Preparation of Concrete for Lining: After cleaning, the interior surface shall be prepared for lining. Loose or missing material shall be removed and replaced, actively leaking areas plugged, and voids patched. Any patching and/or plugging materials shall be deemed compatible with the lining material used for lining the manhole as determined by the manufacturers. Manhole steps are to be removed from the manhole and their anchor holes plugged utilizing patching material as defined in Specification 2532. Manhole steps are to be removed from the jobsite and disposed of properly. It shall not be acceptable to leave manhole steps which have been removed in the manhole, and any backups caused by such practices will be remediated at the expense of the Contractor.

1. Brick Manholes: Prior to epoxy lining brick manholes, the stair stepped brick surface on the underside of the cones shall be filled in with cementitious liner to create a uniform sloped surface on which to apply the epoxy liner.
- C. Equipment: Provide mixing and application equipment designed for mixing and spraying epoxy coating as recommended by the manufacturer.
- D. Mixing: The two (2) part epoxy liner shall be mixed in accordance with the manufacturer's recommendations.
- E. Application: The epoxy or polyurea liner shall be applied in accordance with the manufacturer's recommendations. The surface prior to application may be damp but shall not have noticeable free running water. Materials shall be spray applied in one coating to an average thickness of 175 mils with a minimum thickness of 165 mils. The final application shall have a minimum of four (4) hours cure time before being subjected to active flow for epoxy systems and one (1) hour for polyurea systems. The epoxy or polyurea liner shall be applied over the entire interior surface of the structure with the exception of the trough (flow channel).
- F. Curing: Curing of the applied lining material shall be done in accordance with the manufacturer's recommendations. Sufficient cure time shall be provided prior to subjecting the applied liner to active flow.
- G. Weather: No application shall be made to frozen surfaces, or if freezing is expected to occur inside the substrate within 24 hours after the application. Specific recommendations and field methods approved by the manufacturer shall be followed for applying lining material when ambient temperatures are less than 45°F or in excess of 95°F.
- H. Quality Control and Inspection: During the application, a wet film gauge shall be used regularly to ensure that minimum thickness is being maintained. After the epoxy or polyurea liner has set (hard to touch) all visible pinholes shall be repaired. Repairs shall be made by lightly abrading the surface and brushing the lining material over the area. All blisters and evidence of uneven coverage shall be repaired according to the manufacturer's recommendations. After the product has set to touch, the surface shall be inspected for pinholes and thin spots using a Holiday Detector capable of 16,000 volts. The minimum voltage utilized during this "Holiday Testing" shall be 50 volts per mil of coating thickness or a minimum of 12,500 volts. Pinholes and areas less than one square foot that test to be thin may be retouched by hand, but any areas larger than one square foot must be re-sprayed. Retouching and re-spraying shall be performed according to the manufacturer's requirements.
- I. After testing the area from six inches (6") below the top of the cone to the top of the frame shall be coated with the flexible liner material identified in Paragraph 3.03 of this Section.

3.03 FLEXIBLE LINER

Installation of the flexible liner shall consist of cleaning the interior surface of the manhole frame and cover; lining the interior of the manhole with the flexible coating system which provides a durable, high strength, monolithic lining, at an average thickness of 250 mils with a minimum thickness of 245 mils from six (6") inches below the top of the cone section to three (3") below the top of the frame.

- A. Cleaning

1. Cleaning shall consist of completely removing dirt, debris, grease or other surface contaminants from the surface of the epoxy manhole liner from the top of the cone to the top of the frame. Remove any dust, laitance, grease, paint, rust, scale or any other surface contaminants from the interior surfaces of the adjustment ring(s) and the frame and cover as defined herein. The entire interior surface of the frame and cover shall be prepared according to SSPC-SP6 "Commercial Blast Cleaning." An alternative method of cleaning maybe the use of a high pressure (greater than 5000 psi) water (potable) spray or water with sand injections. The anchor profile for surface preparation shall be a minimum of 2 mils. All excess butyl joint sealant shall be removed prior to the installation of the flexible epoxy coating material.
- B. Equipment: Provide mixing and application equipment designed for mixing and applying the flexible liner material as recommended by the manufacturer.
- C. Mixing: The flexible liner material shall be mixed in accordance with the manufacturer's recommendations.
- D. Application: After the adjustment ring(s), frame seal, and frame have been cleaned and prepared, the flexible liner material shall be installed from six inches (6") below the top of the cone section to three (3") inches below the lip of the bearing surface of the frame. The surface prior to application shall be moisture and contaminant free. Materials shall be hand or sprayed applied per manufacturer's recommendations to an average thickness of 250 mils with a minimum thickness of 245 mils. The final application shall have a minimum of twenty-four (24) hours cure time before being subjected to personnel access or surface loading.
- E. Curing: Curing of the applied lining material shall be done in accordance with the manufacturer's recommendations. Sufficient cure time shall be provided prior to subjecting the applied liner to active flow. Traffic shall not be allowed over substrates until sufficient cure time has elapsed.
- F. Weather: No application shall be made to frozen surfaces, or if freezing is expected to occur inside the substrate within 24 hours after the application. Specific recommendations and field methods approved by the manufacturer shall be followed for applying lining material when ambient temperatures are less than 45° F or in excess of 95° F.
- G. Quality Control and Inspection: During the application, a wet film gauge shall be used regularly to ensure that minimum thickness is being maintained. After the flexible liner has set (hard to the touch), all visible pinholes shall be repaired. Repairs shall be made by lightly abrading the surface and brushing the lining material over the area. All blisters and evidence of uneven coverage shall be repaired according to the manufacturer's recommendations. After the product has set to touch, the surface shall be inspected for pinholes and thin spots using a Holiday Detector capable of 16,000 volts. The minimum voltage utilized during this "Holiday Testing" shall be 50 volts per mil of coating thickness or a minimum of 12,500 volts. Pinholes and areas less than one square foot that test to be thin may be retouched by hand, but any areas larger than one square foot must be re-sprayed. Retouching and re-spraying shall be performed according to the manufacturer's requirements.

END OF SECTION 2532

SECTION 2533 - MANHOLE REHABILITATION

PART 1 - GENERAL

1.01 WORK INCLUDED IN THIS SECTION

- A. This section governs the furnishing of all labor, equipment, tools, and materials, and the performance of all Work incidental to the inspection and rehabilitation of brick, block, and precast and poured concrete sanitary sewer manholes and storm sewer manholes and structures.
- B. Rehabilitation of existing manholes shall consist of the completion of inspection, repair, and replacement work items indicated for specific manholes listed in the Rehabilitation Schedules. The design details include the following information:
 - 1. Manhole Location.
 - a. Manhole identification number; and
 - b. Street address of general location where manhole is located.
 - 2. Manhole Existing Condition Information.
 - a. Manhole diameter;
 - b. Manhole depth;
 - c. Diameter of structure at flattop seal location;
 - d. Manhole wall material type (e.g., brick, block, poured, pre-cast); and
 - e. Surface condition (e.g., paved or unpaved).
 - 3. Manhole Proposed Work.
 - a. Inspection work items, and
 - b. Rehabilitation work items.
- C. General layout maps showing approximate locations of existing manholes and the Rehabilitation Schedule are provided on the GIS Site Map and Dashboard. Manholes scheduled for work are highlighted on the general layout maps. Street names are also indicated on the general layout maps.
- D. Access to available photographs/video of manhole interiors is available.
- E. Work items noted as paved on the Rehabilitation Schedules are defined as any surface constructed of concrete, asphaltic concrete, or gravel that must be removed by hydraulic or pneumatic equipment to complete the rehabilitation work as specified. For example, surfaces such as streets, curbs and gutters, sidewalks, driveways, patios, and hiking and biking trails constructed with concrete or asphaltic concrete are defined as paved. Gravel surfaces constructed to allow vehicular traffic are also considered paved surfaces for payment. Stamped concrete, permeable or porous asphalt surfaces, and surfaces with heating elements are considered beyond the scope of paved surfaces.
- F. Work items noted as unpaved on the Rehabilitation Schedules are defined as dirt and/or vegetation that can be restored to match the existing surface with sod or seed. Surfaces with hard scape block or rock that can be removed and replaced by hand are also considered to be unpaved.

1.02 SPECIFICATION MODIFICATIONS

- A. It is understood that throughout this section these Specifications may be modified by appropriate items in the notes on the Contract Drawings.

1.03 REVISIONS OF STANDARDS

- A. When reference is made to a Standard Specification i.e. ASTM, ANSI, AWWA, MCIB, the Specification referred to shall be understood to mean the latest revision of said

specification as amended at the time of the Notice to Bidders, except as noted on the Drawings.

1.04 RESTORATION

- A. The Contractor shall restore the project sites to conditions equal to or better than those existing prior to entry. All existing items and construction removed or damaged during the performance of the Work, regardless of location and whether or not indicated in these Contract Documents, shall be repaired or replaced as detailed in the Contract Specifications unless otherwise indicated on the Contract Drawings.

1.05 FLOW BYPASS

- A. If necessary to perform the Work, the Contractor shall bypass flow in accordance with the requirements of Section 2505.5 Bypass Pumping, of the Technical Provisions.

1.06 SALVAGED MATERIALS

- A. Existing manhole frames and covers from rehabilitated, removed, or abandoned manholes shall not be reused in the Work (unless specified to do so) and shall be delivered to the Owner at the Kaw Point WWTP located at 61 Market Street, Kansas City, Kansas.

1.07 PROGRESS OF WORK

- A. All scheduled total replacement, point repair(s), or Cured-In-Place Pipe (CIPP) lining of main line pipes or service laterals connected to a manhole shall be completed prior to initiating any scheduled Work items on said manhole.
- B. All manhole rehabilitation Work items that require excavation around the exterior of the manhole shall be completed prior to initiating any scheduled interior Work items on said manhole.
- C. All manhole lining Work shall be completed only after all other scheduled rehabilitation Work items on said manhole have been completed and tested (where applicable).
- D. If a manhole scheduled for an inside drop installation is also scheduled for cementitious and/or epoxy liner installation, the new inside drop bowl, fittings, and piping may be installed before or after liner installation at the Contractor's discretion, per the following requirements:
 - 1. Install liner(s) first. Then, install the inside drop bowl, fittings, and piping. Patch the anchor penetrations through the liner(s) in accordance with the liner material manufacturers' recommendations.
 - 2. Install the inside drop bowl, fittings, and piping first. Then, install liner(s). Care shall be taken to ensure each liner material thickness is as specified around and behind the drop piping and brackets. Provide multiple thickness measurements in these areas to ensure the required liner thickness is achieved.

1.08 SUBMITTALS

- A. The Contractor shall provide certifications or shop drawings on all materials provided under these specifications.

1.09 QUALIFICATIONS

- A. Manhole Rehabilitation
 - 1. The Contractor and Contractor's staff shall have experience completing various manhole rehabilitation Work items. The Contractor shall be certified by the manufacturer of a particular item to be incorporated into the Work that said Contractor is a fully trained user of the item. Personnel directly involved in

applying or installing the item shall receive training in the proper methods for handling and installing the item. Training shall be performed by a qualified representative.

B. Manhole Lining

1. The Contractor shall meet the qualifications listed in Section 2532.

1.10 MEASUREMENT AND PAYMENT

- A. Measurement and Payment for the Work Items included in the Rehabilitation Schedules shall be as described in Section 1100, Progress and Payment.

PART 2 - PRODUCTS

2.01 MANHOLE MATERIALS

- A. Manhole Frame Gasket. Gasket shall be 3/8" round O-ring 60 durometer closed cell neoprene.
- B. Manhole Castings. Manhole castings (frames and covers) shall meet the requirements of Section 2509.
- C. Flexible Liner. Flexible liner shall meet the requirements of Section 2532, Paragraph 2.01, C.
- D. Patching Material. Patching material shall meet the requirements of Section 2532, Paragraph 2.01, A.1.
- E. Infiltration Control Material. Infiltration control material shall meet the requirements of Section 2532, Paragraph 2.01, A.2.
- F. Chemical Grout. Use acrylamide or urethane chemical grout gel to seal external voids and internal defects, repair pipe seals, and stop active leaks in the manhole prior to completing other scheduled Work. Foams are not acceptable. The chemical grout material shall meet the requirements of Section 2532, Paragraph 2.01, A.3.c.
- G. Cementitious Manhole Liner. Cementitious manhole liner shall be as specified in Section 2532, Paragraph 2.01, A.
- H. Epoxy Manhole Liner. Epoxy manhole liner shall be as specified in Section 2532, Paragraph 2.01, B.
- I. Polyurea Manhole Liner. Polyurea manhole liner shall be as specified in Section 2532, Paragraph 2.01, B.
- J. HDPE Manhole Liner. HDPE manhole liners used for special poured in place concrete structures inside the existing manhole shall be AGRU Ultra-Grip HDPE Liner or equal.
- K. Joint Sealant. Joint sealant shall meet the requirements of Section 2509.
- L. Concrete Bonding Agent. Bonding agent used to improve adhesion between mortar, existing brick and concrete surfaces shall be a special formulation of acrylic polymers and modifiers, designed for use as an additive to cement mixes to improve adhesion and mechanical properties.
- M. Joint Wraparound Sleeves. Joint wraparound sleeves shall be as specified in Section 2509.
- N. Grade Adjustment Riser Ring. New manhole grade adjustment riser rings shall meet the requirements of Section 2509.
- O. Flattop.
1. Brick Manholes. New manhole flattops to be installed on existing brick manholes shall be pre-cast concrete with an outside diameter large enough to span the opening of the cone plus two inches around the entire outside circumference. The flattop shall have a minimum thickness of eight inches and shall not have

- any grooves. Reinforcement of the concrete flattop shall conform to ASTM C478. All flattops shall be designed to withstand HS20 loadings.
2. Pre-cast Manholes. New manhole flattops to be installed on existing pre-cast concrete manholes shall match the diameter and joint configuration of the existing manhole. Flattops shall meet the requirements of Section 2509. All flattops shall be designed to withstand HS20 loadings.

PART 3 - EXECUTION

3.01 NON-EXCAVATION REQUIRED MANHOLE REHABILITATION

A. Replace Manhole Frame Gasket.

1. Remove the existing manhole frame gasket and pieces thereof from the groove in the existing frame.
2. Remove all debris, dirt, sand, etc. from the groove and wipe the groove clean with a wet towel to provide a clean sealing surface. Take care not to gouge or deform the surface of the groove.
3. Place the new manhole frame gasket into the clean groove making sure not to twist the gasket during placement.
4. Reset the existing cover in a manner as to not roll the gasket.

B. Replace Existing Cover with UG Standard Cover.

1. Remove the existing cover and provide a new UG standard cover of the proper size to fit the existing frame. The new cover size shall be such that the cover depth matches the existing frame and the diameter of the cover is not less than $\frac{1}{4}$ inch of the diameter of the existing frame.
2. Set the new cover on the existing frame.
3. Salvage the existing cover per Paragraph 1.04, A.

C. Replace Existing Cover with UG Standard Bolt Down Cover.

1. Remove the existing bolt down cover and provide a new UG standard bolt down cover of the proper size to fit the existing frame. The new cover size shall be such that the cover depth matches the existing frame and the diameter of the cover is not less than $\frac{1}{4}$ inch of the diameter of the existing frame.
2. Place a new manhole frame gasket into the clean groove making sure not to twist the gasket during placement.
3. Set the new bolt down cover on the existing frame in a manner as to not roll the gasket.
4. Salvage the existing bolt down cover per Paragraph 1.04, A.

D. Install Flexible Liner.

1. Install a flexible liner as specified in Section 2532, Paragraph 3.03.

E. Repair Cracks and Joints.

1. Cleaning. Completely remove dust, dirt, laitance, debris, grease, paint, rust, scale, other surface contaminants, excess butyl, and other joint sealants from the surface of the existing precast structure cracks and joints to be repaired. The entire interior surface of the cracks and joints shall have all surface contaminants removed using high pressure (greater than 2,000 psi) water (potable) spray.
2. Active Infiltration. All active infiltration shall be stopped prior to installation of the flexible liner. Contractor shall determine best method for stopping infiltration

using patching material, infiltration control material, or chemical grout as specified in Paragraph 2.01.

3. Equipment. Provide mixing and spray application equipment designed for mixing and applying the flexible liner as recommended by the manufacturer.
4. Application. After the cracks and joints have been cleaned, install the flexible liner from three (3) inches below and three (3) inches above each crack and joint to provide a durable, high strength, monolithic lining. The surface prior to application shall be moisture and contaminant free. Materials shall be spray or hand applied per manufacturer's recommendations to an average thickness of 250 mils per Section 2532, Paragraph 3.03.

F. Repair and Grout Pipe Seals.

1. Remove all unsound concrete material from around each pipe seal, including service lateral pipe seals.
2. Remove any mineral deposits, roots, grease, debris, or any other material that will hinder the bonding of the patching material and infiltration control material. All 0.25-inch wide and greater voids and cracks shall be repaired with patching material. All active leaks shall be repaired with infiltration control material.
3. To ensure that pipe seals are surrounded and waterproofed, a minimum of two grout injection holes shall be drilled at locations outside of the upper left and upper right quadrants of each pipe, including service laterals. If a pipe is above the bench, four holes shall be drilled around the pipe.
4. Inject chemical grout through the injection holes under pressure with a suitable probe and injection pump as recommended by the manufacturer to seal external voids and internal defects. The chemical grout injection pumps shall be equipped with meters for monitoring pressure during the injection. The injection pressure shall not cause damage to the manhole structure or the surrounding surface features.
5. Grout travel shall be verified by observation of grout from defects and/or holes near the point of injection. Upon this observation, the grouting probe should be moved to the next injection hole. This procedure shall be repeated until all pipe seals, including service laterals, are externally sealed with grout. After removal of the grouting probe, injection holes shall be cleaned and plugged with a patching material.

G. Repair Bench and Trough (48-, 60-, and 72-Inch Dia.).

1. Completely remove unsound concrete, grease, roots, mud and debris to a depth necessary to expose a sound sub-base to allow for proper forming, shaping, and finishing of the bench and invert. The entire interior surface of the bench, trough, and invert shall have all oil, grease, rust, and any other surface contaminants removed using high pressure (greater than 2,000 psi) water (potable) spray.
2. Replace removed bricks and reform and refinish loose bricks and mortar.
3. Repair voids and cracks with patching material. Repair all active leaks with infiltration control material.
4. Form, shape, and finish the bench and invert using cementitious patching material to construct a manhole floor and flow channels. Benches and inverts shall be shaped and finished smooth and free of ridges so that manholes will be self-cleaning and free of areas where solids may be deposited as sewage flows through the manhole from all in-flowing pipes to the out-flowing pipe(s).
5. The cementitious patching material shall be troweled uniformly onto the damaged bench and invert at a minimum thickness of ½-inch. The patching material shall

not be allowed to enter any pipes. The flow through the manhole may be re-established within 30 minutes after placement of the patching material unless a longer period is recommended by the manufacturer.

3.02 MANHOLE LINING

A. **Install Cementitious Liner (48-, 60-, and 72-Inch Dia.).**

1. Install a monolithic, cementitious manhole liner as specified in Section 2532, Paragraph 3.01.

B. **Install Epoxy and Polyurea Liner (48-, 60-, and 72-Inch Dia.).**

1. Install a monolithic, epoxy manhole liner in an existing manhole as specified in Section 2532, Paragraph 3.02.

C. **Install Epoxy and Polyurea Liner in New Manhole (48-, 60-, and 72-Inch Dia.).**

1. Install a monolithic, epoxy manhole liner in a new manhole as specified in Section 2532, Paragraph 3.02.

D. **Install Cementitious and Epoxy or Polyurea Liners (48-, 60-, and 72-Inch Dia.).**

1. Install a monolithic, cementitious manhole liner as specified in Section 2532, Paragraph 3.01.
2. The Owner must approve the cementitious manhole liner installation prior to installing the epoxy manhole liner. Such approval shall in no way relieve the Contractor of any responsibility for the adequacy of the cementitious liner.
3. Install a monolithic, epoxy manhole liner as specified in Section 2532, Paragraph 3.02. Before installing the epoxy liner, the cementitious liner shall be cured a minimum of 48 hours, or as recommended by both liner manufacturers.

3.03 EXCAVATION REQUIRED MANHOLE REHABILITATION

A. **Replace Existing Frame and Cover with UG Standard Frame and Cover or UG Standard Bolt Down Frame and Cover (Paved and Unpaved).**

1. As necessary, saw cut the existing pavement in a 6' x 6' square (approximate) around manholes identified as being located in paved areas. Excavate a 6' x 6' area (approximate) around the existing frame and cover. The excavation shall be to a depth approximately 6" below the top of the manhole cone.
2. Remove the existing frame and cover and repair any damage to the existing grade adjustment and/or cone.
3. Salvage the existing frame and cover per Paragraph 1.04, A.
4. Apply a thin cementitious patching material bed to the existing brick or concrete cone surface for leveling, and allow to cure before placement of the joint sealant. Concrete bonding agent shall be mixed into the patching material as recommended by the manufacturer of the bonding agent.
5. Install the new UG standard frame and cover or standard bolt down frame and cover as specified.
6. Seal all joints between the new frame and grade adjustment/cone with two concentric rings of joint sealant.
7. Any new grade adjustment shall be placed in accordance with Section 2509.
8. Apply joint wraparound sleeves at all joints between the casting, grade adjustment ring(s) and the manhole cone or first construction joint as specified in Section 2509 and as recommended by the manufacturer.
9. Tops of manholes located in paved areas and unpaved traveled ways shall be set flush to the existing pavement or existing finished grade. Tops of manholes

located in unpaved areas shall be set two inches above the existing finished grade.

10. Backfill the excavation as specified in Section 2506.

B. Replace Grade Adjustment (Paved or Unpaved).

1. As necessary, saw cut the existing pavement in a 6' x 6' square (approximate) around manholes identified as being located in paved areas. Excavate a 6' x 6' area (approximate) around the existing frame and cover. The excavation shall be to a depth approximately 6" below the top of the manhole cone.
2. Remove the existing frame and cover and grade adjustment and repair any damage to the existing cone.
3. Salvage the existing frame and cover per Paragraph 1.04, A. if a new frame and cover are scheduled to be provided. Dispose of existing grade adjustment.
4. Apply a thin cementitious patching material bed to the existing brick or concrete cone surface for leveling, and allow to cure before placement of the joint sealant. Concrete bonding agent shall be mixed into the patching material as recommended by the manufacturer of the bonding agent.
5. Reinstall the existing frame and cover (or install the new UG standard frame and cover or UG standard bolt down frame and cover, if scheduled to be provided).
6. Seal all joints between the new frame and grade adjustment/cone with two concentric rings of joint sealant.
7. Install new grade adjustment riser rings as specified in accordance with Section 2509. Adjustment will be limited between 3-inches above grade and 12-inches below grade as scheduled.
8. Apply joint wraparound sleeves at all joints between the casting, grade adjustment ring(s) and the manhole cone or first construction joint as specified in Section 2509 and as recommended by the manufacturer.
9. Tops of manholes located in paved areas and unpaved traveled ways shall be set flush to the existing pavement or existing finished grade. Tops of manholes located in unpaved areas shall be set two inches above the existing finished grade.
10. Backfill the excavation as specified in Section 2506.

C. Add Grade Adjustment (Paved or Unpaved).

1. As necessary, saw cut the existing pavement in a 6' x 6' square (approximate) around manholes identified as being located in paved areas. Excavate a 6' x 6' area (approximate) around the existing frame and cover. The excavation shall be to a depth approximately 6" below the top of the manhole cone.
2. Remove the existing frame and cover and grade adjustment and repair any damage to the existing cone.
3. Salvage the existing frame and cover per Paragraph 1.04, A. if a new frame and cover are scheduled to be provided. Dispose of existing grade adjustment.
4. Apply a thin cementitious patching material bed to the existing brick or concrete cone surface for leveling, and allow to cure before placement of the joint sealant. Concrete bonding agent shall be mixed into the patching material as recommended by the manufacturer of the bonding agent.
5. Reinstall the existing frame and cover (or install the new UG standard frame and cover or UG standard bolt down frame and cover, if scheduled to be provided).
6. Seal all joints between the new frame and grade adjustment/cone with two concentric rings of joint sealant.

7. Install new grade adjustment riser rings as specified in accordance with Section 2509. Adjustment will be limited between 3-inches and 18-inches above grade as scheduled.
8. Apply joint wraparound sleeves at all joints between the casting, grade adjustment ring(s) and the manhole cone or first construction joint as specified in Section 2509 and as recommended by the manufacturer.
9. Tops of manholes located in paved areas and unpaved traveled ways shall be set flush to the existing pavement or existing finished grade. Tops of manholes located in unpaved areas shall be set two inches above the existing finished grade.
10. Backfill the excavation as specified in Section 2506.

D. Install Flattop on Existing Manhole (48-, 60-, and 72-Inch Dia.) (Paved and Unpaved).

1. As necessary, saw cut the existing pavement around manholes identified as being located in paved areas. Excavate an area around the existing manhole as necessary to perform the Work.
2. Excavate, demolish, and remove the existing frame and cover, grade adjustment, and cone to the required elevation and repair any damage to the existing cone.
3. Salvage the existing frame and cover per Paragraph 1.04, A. Dispose of existing grade adjustment and removed cone.
4. Apply a thin cementitious patching material bed to the existing cone surface for leveling, and allow to cure before placement of the joint sealant. Concrete bonding agent shall be mixed into the patching material as recommended by the manufacturer of the bonding agent.
5. Install the new pre-cast concrete flattop of the specified diameter on top of the existing manhole cone surface.
6. Prior to ordering necessary manhole components, Contractor shall confirm the depth of the structure to be replaced and the diameter of the structure at the depth of replacement measurements by field measurement.
7. Install the new UG standard frame and cover or UG standard bolt down frame and cover, as scheduled.
8. Seal all joints between the frame and grade adjustment, flattop and grade adjustment, and cone and flattop with two concentric rings of joint sealant.
9. Install new grade adjustment riser rings as specified in accordance with Section 2509.
10. Apply joint wraparound sleeves at all joints between the casting, grade adjustment ring(s) and the manhole cone or first construction joint as specified in Section 2509 and as recommended by the manufacturer.
11. Tops of manholes located in paved areas and unpaved traveled ways shall be set flush to the existing pavement or existing finished grade. Tops of manholes located in unpaved areas shall be set two inches above the existing finished grade.
12. Backfill the excavation as specified in Section 2506.

E. Replace Existing Manhole Cone and Above (48-, 60-, and 72-Inch Dia.) (Paved and Unpaved).

1. As necessary, saw cut the existing pavement around manholes identified as being located in paved areas. Excavate an area around the existing manhole as necessary to perform the Work.

2. Excavate, demolish, and remove the existing frame and cover, grade adjustment, and cone to the required elevation and repair any damage to the existing cone.
3. Salvage the existing frame and cover per Paragraph 1.04, A. Dispose of existing grade adjustment and removed cone.
4. Apply a thin cementitious patching material bed to the existing cone surface for leveling, and allow to cure before placement of the joint sealant. Concrete bonding agent shall be mixed into the patching material as recommended by the manufacturer of the bonding agent.
5. Install the new pre-cast concrete cone of the specified diameter as specified in Section 2509.
6. Prior to ordering necessary manhole components, Contractor shall confirm the depth of the structure to be replaced and the diameter of the structure at the depth of replacement measurements by field measurement.
7. Install the new UG standard frame and cover or UG standard bolt down frame and cover, as scheduled.
8. Seal all joints between the frame and grade adjustment and cone and grade adjustment with two concentric rings of joint sealant.
9. Install new grade adjustment riser rings as specified in accordance with Section 2509.
10. Apply joint wraparound sleeves at all joints between the casting, grade adjustment ring(s) and the manhole cone or first construction joint as specified in Section 2509 and as recommended by the manufacturer.
11. Tops of manholes located in paved areas and unpaved traveled ways shall be set flush to the existing pavement or existing finished grade. Tops of manholes located in unpaved areas shall be set two inches above the existing finished grade.
12. Backfill the excavation as specified in Section 2506.

F. Replace Existing Manhole Barrel, Cone, and Above (48-, 60-, and 72-Inch Dia.) (Paved and Unpaved).

1. As necessary, saw cut the existing pavement around manholes identified as being located in paved areas. Excavate an area around the existing manhole as necessary to perform the Work.
2. Excavate, demolish, and remove the existing frame and cover, grade adjustment, cone, and barrel to the required elevation and repair any damage to the existing cone.
3. Salvage the existing frame and cover per Paragraph 1.04, A. Dispose of existing grade adjustment and removed cone and barrel.
4. Apply a thin cementitious patching material bed to the existing brick or concrete surface for leveling, and allow to cure before placement of the joint sealant. Concrete bonding agent shall be mixed into the patching material as recommended by the manufacturer of the bonding agent.
5. Install the new pre-cast concrete cone and barrel of the specified diameter as specified in Section 2509.
6. Prior to ordering necessary manhole components, Contractor shall confirm the depth of the structure to be replaced and the diameter of the structure at the depth of replacement measurements by field measurement.
7. Install the new UG standard frame and cover or UG standard bolt down frame and cover, as scheduled.
8. Seal all joints between the frame and grade adjustment, cone and barrel, and cone and grade adjustment with two concentric rings of joint sealant.

9. Install new grade adjustment riser rings as specified in accordance with Section 2509.
10. Apply joint wraparound sleeves at all joints between the casting, grade adjustment ring(s) and the manhole cone and barrel as specified in Section 2509 and as recommended by the manufacturer.
11. Tops of manholes located in paved areas and unpaved traveled ways shall be set flush to the existing pavement or existing finished grade. Tops of manholes located in unpaved areas shall be set two inches above the existing finished grade.
12. Backfill the excavation as specified in Section 2506.

G. Monoform Plus Manhole Rehabilitation (48-, 60-, and 72-Inch Dia.) (Paved and Unpaved).

Where indicated on the Manhole Rehabilitation Schedule, the existing manhole structure shall have a new concrete structure with HDPE liner installed within the existing manhole of the size indicated on the Drawings and as specified.

1. As necessary, saw cut the existing pavement in a 6' x 6' square (approximate) around manholes identified as being located in paved areas. Excavate a 6' x 6' area (approximate) around the existing frame and cover. The excavation shall be to a depth approximately 6" below the top of the manhole cone.
2. Remove the existing frame and cover, grade adjustment and cone to a point where the inside diameter is equal to 36-inches.
3. Salvage the existing frame and cover per Paragraph 1.04, A. if a new frame and cover are scheduled to be provided. Dispose of existing debris.
4. Remove all steps.
5. Clean entire manhole with high pressure washer. Remove all debris, grease and loose material from the structure's surface.
6. Bench and invert installation. Manholes scheduled for Monoform Plus shall have the bench and invert lined with a HDPE liner to match the wall liner material. Material will be removed to allow a minimum of 2-inches of new concrete to be placed around the circumference of the invert and over the existing bench at a point half the depth of the outlet invert and tapered up the wall at a minimum slope of 1-inch per foot. A forming system shall be used to provide a smooth, straight, and uniform flow line from the invert of the inlet pipe(s) to the invert of the outlet pipe. Uniform sweeps shall be utilized where necessary.
7. Install forms and HDPE liner. Specially designed forms shall be required to provide rounded surfaces. The forming system shall be designed to fit the existing manhole. The system shall be designed to allow 3-inches of wall thickness (min) in the cone and wall section and 5-inches in the grade adjustment. Block out inserts shall be used to provide full diameter openings for all pipes in the manhole. Install HDPE liner within forms as recommended by manufacturer.
8. Concrete shall have a 28-day cure strength of 4,500 psi. A fibrillated polypropylene (fiber mesh or equal) admixture shall be added according to the admixture manufacturer's recommendations. A water reducing agent shall be used in the concrete mix. If the pour depth is less than 15 vertical feet, the entire liner shall be installed in one pour without joints. If the pour depth exceeds 15 vertical feet, the new liner shall be poured in stages. A water stop shall be installed to ensure a watertight seam is obtained between subsequent pours. Concrete shall be thoroughly consolidated so that it comes into close contact with the forms and fill all existing pockets, seams and cracks. Consolidation shall not

be continued so as to cause segregation or to the extent that localized areas of grout are formed.

9. Weld all HDPE liner seams in accordance with manufacturer's recommendations.
10. Install the new UG standard frame and cover or UG standard bolt down frame and cover, as scheduled.
11. Tops of manholes located in paved areas and unpaved traveled ways shall be set flush to the existing pavement or existing finished grade. Tops of manholes located in unpaved areas shall be set two inches above the existing finished grade.
12. Backfill the excavation as specified in Section 2506.
13. HDPE liner testing. The HDPE liner shall be inspected for pinholes and defective welds in accordance with DVS Code 2227-1. Pinholes and defective welds shall be repaired in accordance with the manufacturer's requirements.

H. Replace Existing Manhole (48-, 60-, and 72-Inch Dia.) (Paved and Unpaved).

Where indicated on the Manhole Rehabilitation Schedule, the existing manhole, cleanout, or lamphole structure shall be totally replaced with a new pre-cast concrete manhole of the size indicated on the Drawings and as specified.

1. As necessary, saw cut the existing pavement around manholes identified as being located in paved areas. Excavate an area around the existing manhole as necessary to perform the Work.
2. Excavate, demolish, remove, and dispose of the existing manhole.
3. Salvage the existing frame and cover per Paragraph 1.04, A.
4. Install a new pre-cast concrete manhole of the required diameter and depth as specified in Section 2509.
5. Prior to ordering necessary manhole components, Contractor shall confirm the depth of the structure to be replaced and the diameter of the structure at the depth of replacement measurements by field measurement.
6. Install the new UG standard frame and cover or UG standard bolt down frame and cover, as scheduled.
7. Seal all joints with two concentric rings of joint sealant.
8. Install new grade adjustment riser rings as specified in accordance with Section 2509.
9. Apply joint wraparound sleeves at all joints between the casting, grade adjustment ring(s) and the manhole cone and barrel as specified in Section 2509 and as recommended by the manufacturer.
10. Tops of manholes located in paved areas and unpaved traveled ways shall be set flush to the existing pavement or existing finished grade. Tops of manholes located in unpaved areas shall be set two inches above the existing finished grade.
11. Backfill the excavation as specified in Section 2506.
12. Reconnect existing lines using pipe and flexible couplings and integral flexible manhole pipe to wall gaskets.
13. Assume that three (3) lineal feet of new DR26 PVC pipe will be required to facilitate connection to existing facilities for each pipe entering or exiting the manhole. Pipe in excess of three lineal feet will be measured and paid as Excavation Required Pipe Rehabilitation.

- 3.04 EXCAVATION REQUIRED PIPE REHABILITATION
- A. **Install DR26 PVC Pipe (8- to 12-Inch Dia., 15- to 21-Inch Dia., 24- to 36-Inch Dia.) (0- to 10-Foot Depth, 10.1- to 20-Foot Depth) (Paved and Unpaved).**
1. When directed by the Owner or the Owner's representative, install additional DR26 PVC pipe of the proper diameter and depth as specified to eliminate deteriorated pipe sections at new manhole replacement sites. Contractor shall allow 5 linear feet of new DR26 PVC pipe for each existing sanitary or storm pipe that is connected to the new manhole to make the final connection. Any piping needed in excess of the 5 linear feet of new PVC, that is not the result of Contractor's errors or over excavation shall be paid in accordance Table D of the Contractor's proposal.
- 3.05 MISCELLANEOUS CONSTRUCTION
- A. **Install Inside Drop Bowl, Fittings, and Piping (8- and 10-Inch Dia. Drop) (Paved and Unpaved).**
1. Remove and dispose of existing drop bowl, fittings, and piping and patch anchor penetrations with patching material (if necessary).
 2. Install the inside drop bowl, fittings, and piping of the required diameter and depth.
- B. **Locate and Provide Access to Not Found and Buried Manholes.**
1. Contractor shall locate and provide access to not found manholes; gain access to manholes that are inaccessible due to reasons such as locked gates, yards with dogs, debris piled on manhole, etc.; open sealed and/or rusted shut covers; and mark buried manholes, as necessary.
 2. Contractor (or their subcontractors) may be required to utilize: personnel and/or equipment to access and review record drawing information from AIMS for field measurements; metal detectors; internal CCTV inspection equipment with remote locating sondes; excavators and equipment sized to match the work required; personnel to facilitate access to difficult sites; and survey equipment to provide coordinates of buried manholes.

END OF SECTION 2533

SECTION 2534 – POLYMER CONCRETE MANHOLES

PART 1 - GENERAL

1.01 WORK INCLUDED IN THIS SECTION

- A. This section governs the furnishing of all labor, equipment, tools, and materials, and the performance of all work incidental to the construction of polymer concrete manholes. Polymer concrete manholes shall be constructed complete with covers, fittings and appurtenances as specified herein. Installation, backfill, testing and restoration shall be in accordance with applicable sections of 2509, Precast Concrete Manholes and Special Structures.

1.02 SPECIFICATION MODIFICATIONS

- A. It is understood that throughout this section these Specifications may be modified by appropriate items in the notes on the Contract Drawings.

1.03 REVISIONS OF STANDARDS

- A. When reference is made to a Standard Specification i.e. ASTM, ANSI, AWWA, MCIB, the Specification referred to shall be understood to mean the latest revision of said specification as amended at the time of the Notice to Bidders, except as noted on the Drawings.

1.04 SUBMITTALS

- A. The Contractor shall provide certifications and shop drawings on all materials provided under these specifications in accordance with the General Requirements.

PART 2 - PRODUCTS

2.01 MANHOLE MATERIALS

- A. Polymer Concrete Manholes AND Components: Polymer concrete manholes or structures shall conform to ASTM C478 and ASTM D6783.
 - 1. Manhole components shall be manufactured by the vibratory vertical casting process resulting in a dense, non-porous, corrosion-resistant, homogeneous, composite structure. Manholes components shall be provided with spigot and bell type joints.
 - 2. Design: Polymer concrete manholes shall be manufactured in one class of load rating. This class shall be H-20 wheel load (minimum 16,000 pounds dynamic wheel load).
 - 3. Reinforcement Steel: Reinforcement steel shall be in accordance with ASTM C478. Per ASTM C478, hoop reinforcement shall only be allowed in 48" diameter manhole risers with no openings. Larger diameter manholes shall not use hoop reinforcement.
 - 4. Manhole Wall Thickness: Wall thickness shall not be less than three (3) inches for 48-inch diameter manholes and four (4) inches for 60-inch or larger manholes.

5. Resin: Use only polyester or vinyl ester resin systems designed for use with this particular application. Resin content shall be a minimum of 7% by weight.
 6. Filler: All aggregate, sand, and quartz powder shall meet the requirements of ASTM C33, where applicable.
 7. Additives: Resin additives, such as curing agents, pigments, dyes, fillers and thixotropic agents, when used, shall not be detrimental to the manhole.
 8. Polymer concrete shall have a minimum unconfined compressive strength of 9,000 psi when measured in accordance with ASTM C497.
 9. Polymer concrete manholes shall be manufactured by U.S. Composite Pipe, Inc., a division of Thompson Pipe Group, or approved equal.
- B. Precast Bases:
1. Monolithically Cast Base: A pre-cast riser section monolithically cast with an integral floor slab shall be used unless prior approval is obtained from the Engineer. The floor shall be a minimum of four (4) inches thick.
 2. Base Diameter: The diameter of the base pad shall be eight (8) inches greater than outside diameter of the manhole.
- C. Flat Slab Tops and Reducer Tops: All flat slab tops and reducers shall be polymer concrete that matches materials used for base and risers. Flat slab tops and reducer tops shall be designed to withstand HS20 loadings regardless of the installation.
- D. Invert Channels: Invert Channels shall be factory built with polymer concrete. Portland cement concrete shall not be allowed for channel construction.
- E. Pipe Openings: The first riser (barrel) section shall be provided with circular openings with continuous, circular, resilient connectors cast into the riser wall.
1. Horseshoe-shaped boxouts, or doghouses, shall not be allowed except when approved by the Owner.
- F. Gaskets: Pipe openings shall contain flexible manhole to pipe gaskets conforming to the requirements of ASTM C923. Flexible connector gaskets shall be manufactured by the Press-Seal Gasket Corporation or the A-LOK Products Inc. The following gaskets may be used for the following pipe diameters and manhole diameters:

ALLOWED MINIMUM MANHOLE DIAMETER*			
Pipe Diameter	A-LOK Products, Inc.		Press-Seal Gasket Corporation
	A-LOK X-CEL	Z-LOK	PSX Direct Drive Boot Gasket
8" to 15"	4'	4'	4'
18"	4'	NA	4'
21"	4'	NA	4'
24"	4'	NA	6'
30"	5'	NA	6'
36"	6'	NA	8'
42"	6'	NA	NA
48"	8'	NA	NA
54"	8'	NA	NA
60"	8'	NA	NA
66"	10'	NA	NA
72"	12'	NA	NA
Max. Pipe Slope	17% (10 degrees)	46% (25 degrees)	28% (16 degrees)
NA=Not Available. *Minimum manhole diameters shown are for straight through manholes. Manhole diameters actually required shall be based on the following factors: actual pipe outside diameter, distance between adjacent pipes, manhole depth, and gasket requirements.			

When PSX gaskets are used, the take-up screws for the gasket clamps shall be positioned a minimum of 90 degrees apart.

- G. Pipe/Base Separation: The minimum distance from the outside diameter of the downstream pipe to the top inside surface of the base shall be three (3) inches. This distance shall be increased as required for proper gasket installation.
- H. Joints
 - 1. Joints between polymer concrete manhole sections shall be sealed with rubber gaskets meeting the requirements of ASTM C443 and utilize either a single offset step or o-ring groove to prevent gasket movement.
- I. Riser Rings:
 - 1. Polymer Concrete Manholes: Rubber risers shall be manufactured and intended for use as sewer appurtenances and shall consist of not less than eighty percent (80%) by weight of recycled rubber tires. The diameter of the rubber risers shall be as required to properly fit and adjust the casting ring. The thickness of a rubber riser ring shall not be less than one (1) inch or greater than four (4) inches. The joints between the cone, riser rings, and casting shall be sealed with a manufacturer-supplied sealant and adhesive that is a polyurethane compound designed for use with concrete materials and shall be resistant to ice melt chemicals and corrosion. Risers for polymer concrete manholes may also be of the same material as the adjoining riser sections.

- J. Lifting Notches: Precast sections may be provided with lifting notches on the inside faces of walls to facilitate handling. Lifting notches for polymer concrete manholes shall be not more than 2 inches deep, holes extending through the wall or placed on the exterior of the wall of the structure shall not be allowed.
- K. Marking: The following information shall be legibly marked on each precast manhole section:
1. Manhole and specification designation
 2. Date of manufacture
 3. Name or trademark of manufacturer
 4. Marking shall be indented into the manhole bases, risers, and cone sections or shall be painted thereon with waterproof paint.
- L. External Joint Sleeves: All precast manhole joints shall be wrapped with one of the following sleeves or as indicated on the Drawings:
1. Butyl Joint Wraparound Sleeves: The butyl component of the wrap shall consist of 50 percent minimum butyl rubber and shall contain 2 percent or less of volatile matter, and shall be 0.035" inch thick. The backing component shall be EPDM rubber that is a minimum of 0.045" thick. A release paper may be used. The butyl rubber-based wrap shall be EZ-Wrap Rubber as supplied by Press-Seal Gasket Corporation, or approved equal.
 2. Heat Shrinkable Wraparound Sleeves: The wrap system shall consist of a two-piece sleeve (backing and adhesive) with a closure system and a G-type primer. It shall consist of an irradiated cross-linked polyefin sheeting, pre-coated with a layer of anti-corrosion adhesive. The backing shall have a minimum recovery of 22 percent. The wrap shall have a mastic type adhesive, specially formulated to become fluid at temperatures achieved during installation and maintain flexibility in cold climates with installation temperatures down to -40° F. Upon cooling the adhesive shall form a tough, elastomeric protective layer. The wrap shall employ a closure seal to allow sealing of the overlap area. The overall thickness of an applied sleeve shall nominally measure 0.01 inch. The heat shrinkable wraparound sleeves shall be "Wrapid Seal" as manufactured by Canusa or approved equal.
- M. Frame and Covers: All frames and covers for polymer concrete manholes shall be fiber reinforced polymer.
- N. Steps: Steps shall be steel core, plastic coated steps with plastic coating being a copolymer polypropylene meeting ASTM D4101. The steel core shall be a minimum of ½-inch in diameter and Grade 60. The requirements of ASTM C478 shall be met except minimum pull-out strength shall be 1,000 pounds.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Installation, backfill, testing and restoration shall be in accordance with applicable sections of 2509, Precast Concrete Manholes and Special Structures.

END OF SECTION 2534

SECTION 5300 - CURED-IN-PLACE PIPE (CIPP) LINING

PART 1 GENERAL

1.01. WORK INCLUDED IN THIS SECTION

This Section governs the rehabilitation of pipelines and conduits by the installation of a resin-impregnated flexible tube, which is tightly formed to the original conduit. The resin is cured using either hot water under hydrostatic pressure or steam pressure within the tube. The Cured-In-Place Pipe (CIPP) shall be continuous and tight fitting.

1.02. RELATED WORK

A.	Site Restoration	Section 2507 – Restoration
B.	Traffic Control	Section 2305 – Maintenance of Traffic
C.	Pipe Televising	Section 1400 – Internal Television Inspection
D.	Open Cut Repair	Section 2500 – Sanitary Sewer Main
E.	Bypass Pumping	Section 2500 – Sanitary Sewer Main
F.	Tightness Tests	Section 2500 – Sanitary Sewer Main
G.	Water and Electric Power	Section 1101 – General Requirements

1.03. SPECIFICATION MODIFICATIONS

- A. It is understood that throughout this section these Specifications may be modified by appropriate items in the notes on the Contract Drawings.

1.04. PROGRESS OF WORK

- A. All scheduled total replacement, point repair(s), or Cured-In-Place Pipe (CIPP) lining of main line pipes or service laterals connected to a manhole shall be completed prior to initiating any scheduled Work items on said manhole.
- B. Point repair(s) shall be performed on a main sewer segment prior to CIPP lining of said main sewer segment.

1.05. SUBMITTALS

The Contractor shall provide certifications or shop drawings on all materials provided under these specifications in accordance with the General Requirements. The Contractor shall submit the following:

- A. The Contractor shall submit to the Engineer for approval, the calculations, technical data, and complete physical properties of the liner and dimensions pertinent to the project.
- B. The Contractor shall submit a work plan to the Engineer for approval. The work plan will detail the preparation steps required for pre-installation (including methodology for point repairs), bypass of existing flow, and the procedures and steps to be followed for the installation.
- C. The Contractor shall submit to the Engineer for approval, the standard curing temperature/pressure/cool-down schedules prior to construction.

- D. The Contractor shall submit one electronic copy of all pre- and post-liner CCTV inspection video images and inspection logs to the Owner for review and permanent record and for acceptance of work prior to final payment.
- E. The Contractor shall submit the pipe diameter, length, calculated CIPP wall thickness, and proposed CIPP wall thickness for each sewer segment to be lined.
- F. The Contractor shall submit the following certificates and affidavits (furnish prior to shipment or installation as applicable): affidavit of compliance with applicable standards for resins and tube materials and certification that the Contractor is a licensed installer of any patented process(es).

1.06. SAFETY REQUIREMENTS:

The Contractor shall complete all work in strict accordance with all applicable current OSHA, federal and state standards and requirements. Particular attention is drawn to those safety requirements involving work on an elevated platform and entry into a confined space. It shall be the responsibility of the Contractor to comply with OSHA standards and regulations pertaining to all aspects of the work.

1.07. REFERENCED DOCUMENTS

- A. This specification references standards from the American Society for Testing and Materials which are made a part hereof by such reference and shall be the latest edition and revision thereof. In case of conflicting requirements between this specification and these referenced documents, this specification will govern.
- B. The following ASTM Standards are referenced:
 - 1. ASTM F1216 - Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube
 - 2. ASTM D5813 - Cured-in-Place Thermosetting Resin Sewer Pipe
 - 3. ASTM D790 - Test Methods for Flexural Properties of Un-Reinforced and Reinforced Plastics and Electrical Insulating Materials, and
 - 4. ASTM D2990 - Tensile, Compressive, and Flexural Creep and Creep-Rupture of Plastics

1.08. QUALITY ASSURANCE

- A. If the product or installer does not meet the qualifications defined below, the Contractor shall provide product or installer that does meet these qualifications at no additional cost to the Owner.
- B. Products and installers seeking approval must meet all of the following:
 - 1. The installer must satisfy all insurance, financial, and bonding requirements of the Owner, and must have been in the CIPP business for at least two (2) years. In addition, the installer must have successfully installed at least 2,000,000 feet of small diameter (6"-12"), 750,000 feet of medium diameter (15"-30"), and 250,000 feet of large diameter (>30") of

the product bid in wastewater collection systems within the preceding 10 years. The installer's onsite superintendents designated for this project must have had at least five (5) years of continuous active experience in the commercial installation of CIPP, and have been employed by the installer for no less than the past twelve (12) months. Acceptable documentation of these minimum installations must be submitted to the Owner. The Owner may, at its discretion, adjust or waive the aforementioned qualifications.

2. Sewer rehabilitation products submitted for approval must provide third party test results supporting the structural performance (short-term and long-term) of the product and such data shall be satisfactory to the Owner. Test samples shall be prepared so as to simulate installation methods and trauma of the product. No product will be approved without verification.
3. There must be a documented quality control and assurance program in place for the engineering applications, manufacturing, and installation. Upon request, the Contractor shall provide the documentation verifying this requirement to the Owner. The Owner shall verify that the Quality Assurance program meets with their approval and is acceptable for the services provided. The tube and resin manufacturing and process shall operate under a quality management system which is third party certified to ISO 9001.
4. Contractor must verify that a 24 hour response time can be met in correcting emergency repairs.

PART 2 PRODUCTS

2.01. MATERIALS

- A. Tube: The Tube shall consist of one or more layers of absorbent non-woven or needled felt fabric and meet the requirements of ASTM F1216, Section 5.1. The tube shall be constructed to withstand installation pressures and temperatures, be compatible with the resin system used, have sufficient strength to bridge missing pipe, and stretch to fit irregular pipe sections.
- B. The wet out Tube shall have a relatively uniform thickness that when compressed at installation pressures will equal or exceed the calculated design wall thickness. The coating shall not be subject to delamination or peeling after curing of the CIPP.
- C. The Tube shall be manufactured to a size that when installed will tightly fit the internal circumference and length of the original pipe. Allowance should be made for circumferential stretching during inversion. Overlapped layers of felt in longitudinal seams that cause lumps in the final product shall not be utilized.
- D. The outside layer of the Tube shall be coated with an impermeable, flexible membrane that will contain the resin and will facilitate monitoring the resin impregnation (wet out) process and post-installation inspection.

- E. The Tube shall be homogeneous across the entire wall thickness containing no intermediate or encapsulated elastomeric layers. No material shall be included in the Tube that may cause delamination in the cured CIPP. No dry or unsaturated layers shall be evident.
- F. The wall color of the interior pipe surface of CIPP after installation shall be a relatively light reflective color so that a clear detailed examination with closed circuit television inspection equipment may be made.
- G. Seams in the Tube shall be as strong as or stronger than the non-seamed felt material.
- H. The Tube shall be marked for distance at regular intervals along its entire length, not to exceed 5 feet. Such markings shall include the Manufacturer's name or identifying symbol.
- I. Resin: The resin system shall be a corrosion resistant polyester, epoxy vinyl ester, or epoxy system including all required catalysts, initiators or hardeners that when cured within the tube create a composite that satisfies the requirements of ASTM F1216 and ASTM D5813, the physical properties herein, and those which are to be utilized in the design of the CIPP for this project. The resin shall produce a CIPP that will comply with the structural and chemical resistance requirements of this specification.

2.02. STRUCTURAL REQUIREMENTS

- A. The CIPP shall be designed as per ASTM F1216, Appendix X1. The CIPP design shall assume no bonding to the original pipe wall. The Owner/Engineer will confirm the design condition of the pipes for this project. These calculations will define the calculated design wall thickness and are contained within the Appendix X1.
- B. The Contractor must have performed long-term testing for flexural creep of the CIPP pipe material installed by his Company. Such testing results shall be used to determine the long-term, time dependent flexural modulus to be utilized in the product design. This is a performance test of the materials (Tube and Resin) and general workmanship of the installation and curing. A percentage of the instantaneous flexural modulus value (as measured by ASTM D790 testing) will be used in design calculations for external buckling. The percentage, or the long-term creep retention value utilized, will be verified by this testing. Retention values exceeding 50% of the short-term test results shall not be used. The materials utilized for the contracted project shall be of a quality equal to or better than the materials used in the long-term test with respect to the initial flexural modulus used in the CIPP design.
- C. The layers of the cured CIPP shall be uniformly bonded. It shall not be possible to separate any two layers with a probe or point of a knife blade so that the layers separate cleanly or the probe or knife blade moves freely between the layers. If the layers separate during field sample testing, new samples will be required to be obtained from the installed pipe. Any reoccurrence may cause rejection of the work.

- D. The cured pipe material (CIPP) shall conform to the structural properties, as listed below.

MINIMUM CIPP PHYSICAL PROPERTIES		
Property	Test Method	Minimum Value
Flexural Modulus of Elasticity	ASTM D790	400,000 psi
Flexural Strength	ASTM D790	4,500 psi

- E. The calculated design wall thickness shall be calculated using the physical properties in paragraph 2.02.D above and in accordance with the most conservative results from the design equations in ASTM F1216 Appendix X1 using the design parameters below. The calculated design wall thickness shall be expressed as an even multiple of 1.5 mm (rounded up). Design Considerations of ASTM F1216 for fully deteriorated conditions, and the following design parameters:

PARAMETER	VALUE
Design Safety Factor	2.0
Retention Factor for Long-Term Flexural Modulus	As determined by long-term tests described in paragraph 2.01.B above, not to exceed 50%, and approved by the Owner
Ovality	Calculated from X1.1 of ASTM F1216, and being not less than 2%
Groundwater Depth (above invert of existing pipe)	At the ground surface
Soil Depth (above crown of existing pipe)	10'-0" or per actual site conditions, whichever is greater; if depth is not available, confirm depth during pre-construction pipe televising and adjust design thickness accordingly
Soil Modulus	700 psi
Soil Density	120 lb per cubic feet
Live Load	AASHTO H20 except for railroad crossings
Design Life	50 years

- F. The required design wall thickness for each sewer segment shall be the greater of the calculated design wall thickness (calculated per paragraph 2.02.E above) and the following specified minimum design wall thicknesses:

8-inch diameter – 6.0 mm
 10-inch diameter – 6.0 mm
 12-inch diameter – 6.0 mm
 15-inch diameter – 7.5 mm
 16-inch diameter – 9.0 mm

The unit price set forth in the Contractor's proposal shall be in accordance with the wall thickness(es) listed on the Bid Form and Rehabilitation Schedules. If the required design wall thickness is larger than the wall thickness listed on the Bid Form, payment shall be based on the required design wall thickness unit price approved through a Work Change Directive and then Change Order. If the pipe depths in the Rehabilitation Schedule were assumed, Contractor shall verify existing depth and adjust the required design wall thickness accordingly.

- G. Any layers of the tube that are not saturated with resin prior to insertion into the existing pipe shall not be included in the structural CIPP wall thickness computation.

2.03. TESTING REQUIREMENTS

- A. Chemical Resistance: The CIPP shall meet the chemical resistance requirements of ASTM F1216, Appendix X2. CIPP samples for testing shall be of tube and resin system similar to that proposed for actual construction. It is required that CIPP samples with and without plastic coating meet these chemical-testing requirements.
- B. Hydraulic Capacity: Overall, the hydraulic cross-section shall be maintained as large as possible. The CIPP shall have a minimum of the full flow capacity of the original pipe before rehabilitation. Calculated capacities may be derived using a commonly accepted roughness coefficient for the existing pipe material taking into consideration its age and condition.
- C. CIPP Field Samples: When requested by the Owner, the Contractor shall submit test results from field installations of the same resin system and tube materials as proposed for the actual installation. These test results must verify that the CIPP physical properties specified in ASTM F1216, Section 8 and have been achieved in previous field applications. Samples for this project shall be made and tested as described in paragraph 3.13 below of this specification section.

PART 3 EXECUTION

3.01. GENERAL

The Contractor shall locate all manhole access points required for executing the work. If a street must be closed to traffic because of the orientation of the sewer, the Contractor shall institute the actions necessary to provide access and traffic control. The Contractor shall supply water and electricity as necessary for cleaning, lining, and other work items. Contractor shall use utility approved water meters and backflow preventers before accessing a public water supply.

3.02. CLEANING OF SEWER LINES

The Contractor shall remove all internal debris, solids, roots, and deposits out of the sewer line that will interfere with the installation of CIPP using accepted sewer cleaning techniques. The Contractor shall dispose of all debris removed from the sewers during the cleaning operation. If any hazardous waste material is encountered during this project, the Owner must be notified before any actions are taken to remove or dispose of hazardous waste.

3.03. BYPASSING SEWAGE

The Contractor, when required, shall provide for the flow of sewage around the section or sections of pipe designated for repair.

3.04. INSPECTION OF PIPELINES

Inspection of pipelines shall be performed by experienced personnel trained in locating breaks, obstacles and service connections using close circuit television (CCTV) PACP

certified inspection techniques. All pre- and post-liner CCTV shall be PACP rated. The pipeline interior shall be carefully inspected to determine the location of any conditions that may prevent proper installation of CIPP. These shall be noted and corrected. The video images shall be recorded electronically and provided to the Owner along with suitable written logs for each line section for later reference by the Owner.

3.05. LINE OBSTRUCTIONS

It shall be the responsibility of the Contractor to clear the line of obstructions such as solids, roots, dropped joints, protruding service connections, crushed or collapsed pipe, and reduction in the cross-sectional area of more than 20 percent that will prevent the insertion of CIPP. Protruding service connections shall be removed to prevent dimpling of the finished liner. Maximum allowable protrusion shall be ½ inch. If inspection reveals an obstruction that cannot be removed by conventional sewer cleaning equipment, a spot repair excavation shall be made to uncover and remove or repair the obstruction.

3.06. PUBLIC NOTIFICATION

The Contractor shall make every effort to maintain sewer service usage throughout the duration of the project. In the event that a connection will be out of service, the longest period of no service shall be eight (8) hours. A public notification program shall be implemented, and shall as a minimum, require the Contractor to be responsible for contacting each home or business connected to the sanitary sewer and informing them of the work to be conducted, and when the sewer will be off-line. The Contractor shall also provide the following:

- A. Written notice to be delivered to each home or business three days prior to the beginning of work being conducted on the section, and a local telephone number of the Contractor they can call to discuss the project or any potential problems. The office number of the appropriately identified the Owner representative shall also be included on this notice.
- B. Personal contact must be conducted with any home or business which cannot be reconnected within the time stated in the written notice.
- C. Properties listed as Critical Facilities on the Contract Drawings shall receive additional written notifications. For properties listed as Critical Facilities, the Owner will distribute a notification letter to the facility at the beginning of the project. The Contractor may be required to reschedule the work or work outside of standard working hours based on requests by the Critical Facilities.

3.07. SERVICE CONNECTIONS

The Contractor shall be responsible for confirming the locations of all branch service connections prior to installing the CIPP. The Contractor or lining installer shall apply experienced judgment and coordinate with the Owner to determine whether or not a service line is active. If approved by the Owner, the Contractor will dye test the approved service lines in advance of lining the segment. The Contractor shall provide a clear record of all service connections that are re-installed after lining the pipe.

3.08. YARD PROTECTIVE MEASURES

The Contractor shall provide protective measures (felt, blocks of wood, plywood, cardboard, concrete blocks, street plates, etc.) to create a barrier between the boiler/steam hoses and grass for each installation.

3.09. INSTALLATION

The Contractor shall allow the Owner to inspect the materials and "wet out" procedure. The lining shall be impervious and free of any leakage from the pipe to the surrounding ground or from the ground to the inside of the lined pipe. CIPP installation shall be in accordance with ASTM F1216, Section 7.

- A. Resin Impregnation: The quantity of resin used for tube impregnation shall be sufficient to fill the volume of air voids in the tube with additional allowances for polymerization shrinkage and the loss of resin during installation through cracks and irregularities in the original pipe wall.
- B. If a vacuum impregnation process is used, the point of vacuum shall be no further than 25-feet from the point of initial resin introduction. After vacuum in the tube is established, a vacuum point shall be no further than 75-feet from the leading edge of the resin. The leading edge of the resin slug shall be as near to perpendicular to the longitudinal axis of the tube as possible. A roller system shall be used to uniformly distribute the resin throughout the tube. If the Installer uses an alternate method of resin impregnation, the method must produce the equivalent results. Any alternate resin impregnation method must be documented to the Owner's satisfaction that the saturation of the CIPP is sufficient.
- C. Tube Insertion: The wet out tube shall be positioned in the pipeline using water or steam inversion only. The tube should be inverted through an existing manhole or approved access point and fully extended to the next designated manhole or termination point. Pull-in type methods of tube insertion are not allowed.
- D. Temperature gauges shall be placed between the tube and the host pipe's invert position to monitor the temperatures during the cure cycle.
- E. Curing shall be accomplished by utilizing hot water under hydrostatic pressure or steam pressure in accordance with the manufacturer's recommended cure schedule. In pipes 18-inches and larger diameter, hot water shall be used for curing of the liner. In pipes smaller than 15-inches diameter, hot water or steam pressure can be used.
- F. Contractor shall submit the minimum time and temperature each tube will be held at in order to achieve the design physical properties, the actual curing time, curing temperature, and cool down time for each CIPP liner performed. This table shall be submitted on a weekly basis to the Engineer.
- G. The Contractor shall cool the hardened pipe to a temperature below 100 degrees Fahrenheit (or as recommended by the manufacturer), before relieving the hydrostatic pressure or steam pressure. Cool water may be added to the column while draining hot water from a small hole at the opposite end of the CIPP, so that a constant water column height is maintained until cool-down is completed. Care shall be taken in the release of the water column so that a vacuum will not be developed that could damage the newly installed liner.
- H. The finished CIPP shall be continuous over the entire length from manhole to manhole and be free from visual defects such as foreign inclusions, dry spots, keel, boat hull, pinholes, wrinkles and other deformities. Any defects which will affect the integrity or strength of the liner or impair maintenance and/or future

rehabilitation activities discovered in the post-installation inspection and during the warranty period shall be repaired at the Contractor's expense.

- I. The CIPP shall make a tight fitting seal with the existing pipe(s) in the manhole. Prior to installation of the CIPP, the Contractor shall install hydrophilic waterstops (CIPP End Seal) to the interior circumference of the existing sewer at the inlet and outlet of each manhole. The seal material shall be "Insignia" by LMK, "Hydrotite" by Greenstreak, or approved equal. The top half of the pipeliner shall be neatly cut off at least two inches (2") away from the walls. Breaking or shearing of the pipeliner will not be allowed. The channel in the manhole shall be a smooth continuation of the pipe(s) and shall be merged with other lines or channels, if any. The sides of the channels shall be built up with mortar/concrete to provide benches at a maximum of 1 in 12 pitch towards the channel.

3.10. SEALER LINER AT ENDS

If due to a broken or misaligned pipe at the access point, the lining fails to make a tight seal, the Contractor shall apply a seal at that point. The seal shall be of a resin mixture compatible with the liner.

3.11. LINER TRIMMING

After the liner has been cured, the liner should be trimmed entering and exiting the manhole, so that it is nearly flush with the manhole wall. For each inversion of two (2) or more line segments using a single liner, the liner should be cut flush with the trough at the intermediate manhole(s). If additional line segments enter these intermediate manhole(s), the liner should not obstruct the flow from these lines.

3.12. REINSTATEMENT OF BRANCH CONNECTIONS

It is the intent of these specifications that branch connections to buildings be re-opened without excavation, utilizing a remotely controlled cutting device, monitored by a CCTV. The Contractor shall certify a minimum of two complete functional cutters plus key spare components are on the job site before each installation or are in the immediate area of the jobsite and can be quickly obtained. Unless otherwise directed by the Owner or his authorized representative, all laterals will be reinstated to not less than 90 percent capacity. Openings shall be free from burrs or projections by grinding the lateral connection area to provide a smooth and crack-free edge. The invert of the lateral connection shall match the bottom of the reinstated lateral opening and be flush with the rehabilitated main sewer. Acceptable lateral openings will be determined by the Owner. No additional payment will be made for excavations for the purpose of reopening connections. The Contractor will be responsible for all costs and liability associated with such excavation and restoration work. Laterals shall be re-instated within one eight (8) hour period and by 5:00 pm, unless prior authorization from the Owner is obtained and written notification to the property owner is provided and acknowledgment from the property owner is received. Any damage or delays associated with a service lateral will warrant notification to the Owner and the property owner.

3.13. INSPECTION

- A. Obtain a field sample from 5% of the main sewer segments and at minimum one sample from each size of main sewer segment scheduled for CIPP lining (locations selected by the Owner). All material testing shall be performed by a registered independent, third party laboratory retained by the Contractor.

- B. CIPP samples shall be prepared and physical properties tested in accordance with ASTM F1216. The flexural properties must meet or exceed the values listed in paragraph 2.02.D above. The flat plate sampling method shall only be used for pipe diameters larger than 18-inches or in areas with limited access, only if approved by the Owner.
 - C. Installed wall thickness of samples shall be determined as described in Section 8 of ASTM F1216. The minimum installed wall thickness at any point shall not be less than 87.5% of the required design wall thickness (as determined in paragraph 2.02.F).
 - D. Visual inspection of the CIPP shall be in accordance with ASTM F1216, Section 8.7. No infiltration of groundwater should be observed at the manholes and all service connections shall be accounted for and be unobstructed.
 - E. Any main sewer segment in which the CIPP liner samples fail to meet the physical properties or installed wall thickness specified herein may be considered defective and subject to rejection and replacement at no additional cost to the Owner.
 - F. Liners that are found to have wrinkles that impair the ability of a wheeled camera to pass through the pipe, inhibit installation of future lateral connection CIPP liners, or cause backwater greater than ½" shall be reworked in a manner acceptable to the Owner such that these problems are eliminated.
- 3.14. TELEVISION INSPECTION OF GRAVITY SEWER 8-INCH IN DIA. AND LARGER
A high quality project video recording of internal conditions of gravity sewer 8-inch in diameter and larger shall be created after construction is complete.
- 3.15. CLEAN-UP
Upon acceptance of the installation work and testing, the Contractor shall restore the project area affected by the operations to a condition at least equal to that existing prior to the work.
- 3.16. WARRANTY
All liner installations shall be warranted to be free from defects in material and workmanship for a period of three (3) years from the date of project acceptance. Should a defect occur during this three (3) year period that is attributable to the liner installation or materials, then this defect shall be repaired within four (4) weeks from the date of defect notification to the Contractor at no additional cost to the Owner. However; if a liner is causing loss of flow or causing a backup the Contractor will repair within 24 hours. The Contractor shall be responsible for all required repair costs associated with a liner failure during the warranty period including all costs associated with lateral backups into buildings and all other property damage.

END OF SECTION 5300

TECHNICAL PROVISIONS

TECHNICAL PROVISIONS

A separate volume titled “Technical Provisions and Standard Drawings for Roads and Sewers”, prepared by the Engineering Division, Public Works Department, Kansas City, Kansas contains technical provisions applicable to this job and are hereby included by reference. The latest edition of the Technical Provisions can be found at the Wyandotte County Website –www.wycokck.org- under Departments pull down menu under Public Works. The revision posted at the time of the pre-bid conference shall apply.

If there is a conflict between the Technical Provisions and the Technical Specifications, the Technical Specifications shall take precedence.

Modifications, amplifications, and/or additions to the Technical Provisions that are applicable to this specific project are provided in the Special Conditions.

TECHNICAL PROVISIONS

Section 1100

General Requirements



Unified Government of Wyandotte County

January 2022

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SECTION 1101 GENERAL REQUIREMENTS FOR UG ADMINISTERED PROJECTS

1101.1 Scope

This Section covers the relationship of the Technical Provisions to the General Conditions and drawings, permit requirements, limits of construction, general requirements for measurement of installed quantities, water and electrical power, posting of no parking areas, mobilization, photographic record, site restoration, and clean up.

1101.2 Applicability

This Section applies only to construction contracts administered by the Unified Government Public Works Department.

1101.3 Related Work

The General Conditions contain other administrative and procedural requirements related to the sequencing and prosecution of the work. The location of specific topics is given below:

A.	Progress Schedules	GC - 3
B.	Shop Drawing Submittal Procedures	GC - 5
C.	Uncovering Untested Work	GC - 7
D.	Substitutions	GC - 8
E.	Staking	GC - 10 and SGC - 3
F.	Contractor's Superintendent	GC - 12
G.	Construction Methods	GC - 12
H.	Job Site Safety	GC - 11 and GC - 42
I.	Change Order Procedure	GC - 13
J.	Correction of Defective Work	GC - 20
K.	Duration of Performance Bond	GC - 37
L.	Weekend and Holiday Work	GC - 41 and GC - 50
M.	Utility Coordination	GC - 11 and GC - 45
N.	Record Documents	GC - 48
O.	Historical and Archeological Deposits	GC - 49

1101.4 Reference Standards

The following standards are referenced throughout the Technical Provisions and Special Conditions. The latest version of these standards shall be used. If conflicting standards are referenced, the more stringent standard shall apply.

KDOT Standard Specifications: shall mean the Standard Specifications for the State Road and Bridge Construction by the Kansas Department of Transportation.

ASTM: shall mean a standard specification by the American Society for Testing and Materials, current edition.

1101.5 Permits

Unified Government permits that may be required for demolition are: haul permit for on road transport of rock, earth, or used building materials; oversized load permit for transport of oversized or overweight equipment or salvaged materials; burn permit for on-site burning of trees and brush; land disturbance permit if area of operations exceeds 1 acre; and blasting permit for use of explosives. Off-site disposal sites located in Kansas City, Kansas require permit from Unified Government building inspection. The contractor shall obtain all necessary permits.

1101.6 Contractor Requirements

- A. Submittals: The following shall be submitted by the Contractor prior to starting construction:
1. Project Superintendent's name and contact information.
 2. Progress Schedule, Schedule for Payments, Subcontractor list, including estimated values of the work to be provided to each Subcontractor.
 3. Copies of construction easement agreements between the Contractor and private parties.
 4. Shop Drawings
 5. Pre-Project Photographic or Video record of existing conditions.
- B. Progress Schedule, Updates, and Site Meetings:
Contractor shall submit initial project schedule at the preconstruction meeting. Contractor shall update the schedule in writing when accumulated variance makes the initial schedule unusable, as determined by Engineer. Contractor shall give Engineer oral notification 48 hours in advance of changes in work location or activity. Contractor and his subcontractors shall attend site meetings as required to fully coordinate the project with Engineer. Failure to provide schedule, to give advance notification, or to fully coordinate the project may result in closure of the work site.
- C. Limits of Construction:
Construction activity (including demolition, clearing, storage of equipment and materials, installation of materials and equipment, and employee parking) shall be restricted to the right-of-ways, easements, Unified Government-owned property indicated on the drawings, and other areas secured by Contractor by private agreement. Engineer shall be informed of Contractor's private arrangements for construction easements and shall be supplied a copy of the written agreement.
- D. Measurement of Installed Quantities:
Contractor shall provide a responsible individual to work with a representative of Engineer to measure all quantities to be paid by unit price. Measurements of work completed shall be made at the end of each day's work. Said measurements shall be the basis of payment, as no remeasurement shall be made at completion of the project.
- E. Water and Electrical Power:
Contractor shall provide water and electrical power required for the work. Cost of water and power shall be subsidiary to the work as a whole.
- F. Project Sign:
The Project sign shall vary by duration of project. Sign shall be black on white of durable weatherproof

construction with professional layout of information:

1. For projects lasting longer than 45 calendar days at a single site use Project Sign detail UG 1101-A.
2. For projects lasting 45 days or less in a single location use Project Sign detail UG 1101-B.
3. For Emergency repairs no sign is required.
4. The contractor shall prominently place the project sign, inspect regularly, clean, repair or replace as needed.

G. Parking Control:

Contractor shall identify where on-street parking must be temporarily prohibited. Engineer will provide temporary signs and direct the installation. Contractor shall provide labor and equipment for installation and subsequent removal of temporary signs. Temporary parking prohibitions shall be posted at least 48 hours in advance of the effective date of parking prohibition. Unified Government will assist in the removal of illegally parked cars. projects lasting 45 days or less in a single location use Project Sign detail UG 1000-B.

H. Photographic Record:

The contractor shall provide photographic record of existing conditions prior to the start of any work and update as necessary throughout the duration of the project. The intent of this requirement is to protect Unified Government and Contractor from claims of inadequate restoration and to protect the property owner from less than complete restoration. Contractor shall maintain photographic records in good order throughout the term of the Contract surety bond or bonds. Photo record shall be delivered to Engineer only when so indicated in the Special Conditions, or when requested by the Engineer. Individual photos shall be made available to Engineer when damaged claims are alleged. If photographic record can not be provided the fault will fall upon the contractor and the contractor will be expected to remedy the claim at their cost.

1. Recorded items shall include private improvements scheduled to be removed and replaced; structures scheduled to remain that may be exposed to ground vibrations or settlement due to adjacent excavation; curbs, walks, and drives scheduled to remain that may be exposed to concentrated construction loads; and trees, shrubs, and turf scheduled to remain within the limits of construction.
2. Each photograph or video shall:
 - i. show sufficient detail to evaluate surface conditions.
 - ii. Identify the project, approximate station, direction and date of view.
 - iii. Provide photographic record images in a digital format with a minimum size of 8.0 megapixels.
3. Contractor shall give Engineer 24 hours' notice of photographic work, so Unified Government representative can accompany Contractor during photography:
 - i. Prior to commencing work in an area to photographically record designated items.
 - ii. 24-hour notice shall be waived for photographic record during emergency condition

SECTION 1102 INSPECTION OF LAND DEVELOPMENT

1102.1 Scope

This section covers third party inspection of developer-installed improvements to be accepted for public maintenance. Topics included are inspector and laboratory qualifications, responsibility for cost of inspection, reporting requirements, pavement mix design, required tests and inspections, remedial tests, corrective actions and extended maintenance bonds.

1102.2 Applicability

These minimum inspection requirements apply to all sanitary sewer, storm sewer, and pavements built by private parties with the intent to dedicate such facilities to the Unified Government for ownership and maintenance. Also covered are all curb, gutter and sidewalk located in public rights-of-way built as part of land development. Construction not subject to these requirements are: driveway installation and repair of curb or walk on previously developed lots, repairs by franchised utilities and projects administered by the Unified Government Public Works Department and the Board of Public Utilities. following terms have the meanings indicated:

1102.3 Construction Standards

Construction shall conform to the Unified Government's minimum construction standards printed as "Technical Provisions and Standard Drawings for Roads and Sewers". Copies are available on the Unified Government's website. Design and construction shall also conform to the separation and protection standards of the Kansas Department of Health and Environment.

1102.4 Definitions

The following terms have the meanings indicated:

- A. County Engineer: Throughout this section County Engineer shall mean the Unified Government County Engineer or his designee.
- B. Construction Engineer: A professional engineer licensed in the State of Kansas, experienced in civil site design and construction, whose relationship to the Owner is that of independent contractor, and who is familiar with the design. Construction Engineer may be an employee of the inspection firm or may be independent of it. Proposed Construction Engineer and all changes in Construction Engineers shall be subject to the approval of the County Engineer.

1102.5 Responsibility for Costs

The developer of the property will pay costs of inspection except the Unified Government will pay cost of the first TV inspection of sanitary sewer lines and storm sewer lines. The developer will pay cost of re-televising lines that fail TV inspection.

1102.6 Laboratory Qualifications

Tests shall be conducted by an independent construction materials testing laboratory certified in soils, asphalt

and concrete by AASHTO or A2LA, and subject to approval by the County Engineer. The laboratory shall have the staff, equipment, qualifications, and experience to perform the tests in accordance with the specified standards. Laboratory may be part of the inspection firm or may be independent of it.

1102.7 County Engineer's Approval of Construction Observers

At any time during the construction of the development or review of the construction, the County Engineer may disqualify the Construction Engineer, the inspection firm, the field inspector, or the laboratory based on failure to demonstrate qualifications, or upon failure to provide timely inspection, or upon discovery of a misrepresentation by the Construction Engineer, the inspection firm, the field inspector or the laboratory in the report prepared for this or any other development in Kansas City, Kansas. In the event of disqualification after the start of the project, all inspection performed by the disqualified firm or individual shall be considered null and void; and the work shall be inspected by alternate means or the remedial inspections and extended maintenance bond provisions shall apply.

1102.8 Mix Designs

Both paving contractor and inspection firm shall review and indicate by their signatures that mix designs for asphalt and concrete meet the minimum construction standards. Mix designs shall be tested by a laboratory independent of the asphalt supplier and shall have been prepared within 12 months prior to construction.

1102.9 Maintenance Bond

- A. Prior to the Unified Government acceptance of private development construction, a single performance and maintenance bond from a surety company authorized to do business in the State of Kansas, as Surety, shall be submitted to the County Engineer. Amount of maintenance bond shall be 100 percent of construction cost. Bond shall indemnify the Unified Government of Wyandotte County/Kansas City Kansas for losses arising from defective materials and installation during the term of the bond. Process agent for the Surety must be named and address provided: Process agent must be a resident of the State of Kansas. Terms and conditions shall be as printed on Attachment B Maintenance Bond form following this section.
- B. Extended Maintenance Bond: Where required due to failure to inspect, surety for extended maintenance shall consist of some combination of the following:
 - 1. Bond equal to the estimated reconstruction costs from a surety company authorized to do business in the State of Kansas
 - 2. Lien against unencumbered real property located in the State of Kansas whose appraised value is equal to the value of the estimated reconstruction costs
 - 3. Cash or cash equivalents equal to the value of the estimated reconstruction costs to be held in escrow by an escrow company located in Wyandotte County.

1102.10 Other Enforcement

No certificate of occupancy for any structure in the development will be issued until both the Construction Engineer's certification and a complete inspection firm's report have been reviewed and approved by the County Engineer and all corrective actions have been completed.

1102.11 Repair of Pavement Cores

Pavement cores shall be repaired by the paving contractor and observed by the inspection firm. Cores in both concrete and asphalt pavements shall be filled full depth with street pavement mix Portland cement concrete. Mix shall be rodded for consolidation, struck off flush with pavement and cured with a curing compound.

1102.12 Construction Engineer's Responsibility

The Construction Engineer shall:

- A. Be familiar with the design and design intent of the proposed construction,
- B. Review adequacy of construction staking and take relative measurements of installed features,
- C. Review, approve and record minor deviations from the design,
- D. Review, correct and deliver to the Unified Government sanitary and storm sewer record drawings,
- E. Observe sewer and manhole tightness tests. After pipe passes tightness tests, notify the County Engineer that the system is ready for TV inspection. Review TV inspection report; propose corrective actions to County Engineer for approval and to direct corrections.
- F. Conduct prepaving inspection to accept street width, subgrade elevation and cross slope, curb dimensions, and confirm manhole and valve box adjustments.
- G. Conduct paving inspection or review inspection firm's logs of paving inspection to confirm pavement thickness.
- H. Observe pavement trueness tests for arterial and collector roads. Observe water ponding depths on all pavements with minimum slope. See Part 1 for reference to pavement trueness testing criteria and corrective action.
- I. Review inspection firm's report for uncorrected deficiencies; propose corrective actions to County Engineer for review and direct corrections.
- J. Complete and sign the following compliance statement. Proposed amendments to the compliance statements shall be explained in writing and are subject to review of the County Engineer.

"Based on familiarity with the design concept and requirements of the Unified Government, on site observations, review of construction staking by others and measurements made personally, review of the inspection firm's report, and on prior review and approval of design deviations all conducted by me or by my qualified staff, it is my professional opinion that for the development known as Name of Development:

- 1. Corrective actions for deficiencies listed in the inspection firm's report have been taken as directed by the County Engineer, documentation is attached.
- 2. Deviations from plan deliver the intended system performance, deviations are marked on record drawings; one copy of the street, storm sewer, and sanitary sewer record drawings has been submitted with an approved digital format to the County Engineer, one copy of the street and storm sewer record drawings has been submitted on Mylar to the County Engineer.
- 3. Sewers and manholes meet tightness requirements, lines have been televised by Unified Government and passed, and reports are attached.
- 4. The installed locations of public improvements are in substantial conformance to the construction plans; road widths are within 2 inches of plan dimension; manhole covers and valve boxes are adjusted to the grade and cross slope of the street; collector and arterial roads meet pavement trueness standards; water ponding depth is within specified tolerance;

curb, walk and pavement dimensions are within tolerance; concrete joints are located, prepared, and sealed within tolerance; and all disturbed survey monuments are re-established.

1102.13 Inspection Firm's Report

The inspection firm shall submit a final inspection report to the County Engineer and the Construction Engineer. The report shall consist of a compliance statement, a list of uncorrected deficiencies, a statement identifying what if any items are required to have extended maintenance bonds, inspector's logs documenting all site visits, test results, and mix designs bearing acceptance signatures of both the paving contractor and the inspecting firm.

Compliance statement is printed below. Proposed amendments to the compliance statements shall be explained in writing and are subject to review of the County Engineer.

"Based on the required field observations or remedial tests, along with the required field and laboratory tests, all conducted by me or by my qualified staff, it is my professional opinion that the specific items of work listed below and completed as part of Name of Development meet the minimum construction standards of the Unified Government of Wyandotte County/Kansas City, Kansas or that the uncorrected deficiencies are prominently listed at the front of this report. Construction Engineer shall:

- A. Roadway embankments were constructed from acceptable material and meet the embankment foundation, placing, and compaction requirements.
- B. Roadway subgrades meet the preparation, compaction and moisture content requirements. Subgrade stabilization was either not required or properly executed.
- C. Utility trenches and inlet and manhole excavations under and adjacent to pavements were backfilled with the required granular material and the backfill meets the compaction requirements. Utility trenches in non-paved areas were backfilled with acceptable materials and meet the compaction requirements.
- D. Concrete curbs gutter and sidewalk meet the mix, thickness, and environmental limits at time of placing, finish, jointing, and curing requirements.
- E. Sanitary and storm sewer mains meet the material, bedding, tapping and alignment requirements.
- F. Manholes and inlets meet the material, backfill, and compaction requirements.
- G. Asphalt job mix complies with the Unified Government Technical Provisions. Asphalt pavements meet the requirements for job mix, total thickness, lift thickness, machine placement requirements, environmental limits and mix temperatures at time of placement, and compaction requirements.
- H. Concrete pavements meet mix, base, thickness, reinforcement and doweling, environmental limits, finish, and curing requirements.
- I. All items requiring extended maintenance bond due to lack of timely testing are listed prominently at the front of this report.

Extended maintenance bond requirements are included in Part 3 of this Specification.

Inspector's log shall at a minimum show the date and time of each visit on the site, record work observed, note deficiencies and corrective actions taken, and record environmental conditions applicable to the current work effort. The record of each visit shall be initialed by the inspector. Test results shall indicate location of the work

sampled, specified limits, and tested values. Failed tests shall be highlighted and annotated to indicate remedial action. The reviewer in the inspection firm shall initial each laboratory report.

1102.14 Inspection Firm's Observation and Tests

The concurrent and alternate, postconstruction observations and inspections listed below shall be conducted by the inspecting firm. Inspection and testing frequencies are listed. Observations shall cover all applicable requirements of the current work. Where daily, but not continuous, observation is required, times of inspection shall vary randomly. Work that fails a concurrent inspection shall be corrected and retested.

- A. Review job mixes for asphalt and concrete.
- B. Embankment Foundation: Observation of the prepared embankment foundation shall be made for all roadway fill sections prior to the placement of fill. Verify clearing, topsoil stripping, foundation scarification and compaction. Identify and establish stabilization method for unsuitable foundation material.

No equivalent post-construction tests. See remedial tests and extended maintenance bond, below.

- C. Roadway Embankment: Daily, but not continuous, observation and compaction testing shall be made for roadway embankments over 4 feet deep. Observe that soil moisture, lift thickness and compaction effort is appropriate for the soil. Observe embankment is benched where required. Perform in-place moisture and density test at a spacing not to exceed 600 foot per lane and at vertical intervals not to exceed 2 foot.

Alternate post-construction test for embankments: Bore, obtain split tube sample and perform density tests at the required sample spacing. Bores shall be made at the edge of the pavement; or conduct a falling weight deflectometer tests at spacing not to exceed 100 feet along the each lane, alternating wheel paths. Analyze for pavement durability. Pavement durability shall meet or exceed 20 years.

- D. Utility Lines: Continuous observation of sanitary and storm pipe materials and pipe laying procedures shall be made. Continuous observation of sanitary and storm trench backfill shall be made.

Daily, not continuous, observation of other utility trench backfill shall be made.

Observe that appropriate granular material or embankment compaction techniques are used under pavements in all trenches. Where backfill material is AB-3 or excavated material, perform in-place moisture and density of the trench every 300 feet and at vertical intervals not to exceed 2 feet to a depth of 6 feet.

Alternate post-construction test for utility trench backfill in trenches not under pavement: Expose and test backfill of the trench every 300 feet and at vertical intervals not to exceed 2 feet to a depth of 6 feet. Pull mandrel through PVC sewer main to demonstrate less than 3% initial deflection.

Alternate post-construction test for utility trench backfill in trenches under pavement: Conduct falling weight deflectometer tests at spacing not to exceed 100 feet along the centerline of the trench and

analyze for pavement durability. Pavement durability shall meet or exceed 20 years. Pull mandrel through PVC sewer main to demonstrate less than 3% initial deflection.

- E. Manholes and Inlets: Observation of all manholes and inlets shall be made prior to backfill. Visually inspect invert shape, wall embedment in base, pipe connection, exterior damp proofing, finish quality of barrels and boxes and tops, installation of gaskets, sealant for manhole casting, grout bed for inlet top, and weight and wording of covers.

Alternate post-construction test for manholes and inlets: Conduct hydrostatic test and visual inspection of invert, pipe penetration and cover casting.

- F. Subgrade: Observation of prepared subgrade shall be made within 48 hours of paving operations. If precipitation occurs between the prepaving inspection and paving operations the prepared subgrade shall be observed for standing water or soft spots immediately before paving. Prepaving inspection shall include the following:
1. Proof-roll subgrade with fully loaded dump truck, or equivalent, to identify soft areas.
 2. One nuclear density test at subgrade surface not to exceed 200 feet per lane (not required for city – capital projects).
 3. If observation of trenches required to have granular fill was not completed concurrent with the work, expose and test at required spacing.
 4. Verify Construction Engineer has made prepaving measurements.

No equivalent post-construction tests. See remedial tests and extended maintenance bond, below.

- G. Asphalt Paving: Continuous observation of paving operations shall be made. For asphalt observe tack coat, color of delivered asphalt, placement and strike off procedure, lift thickness, and compaction effort. Tests on asphalt shall include density tests, stability tests, flow tests, extraction-gradation tests, and 2 nuclear density tests for each 2000 tons cumulative.

No equivalent post-construction tests. See remedial tests and extended maintenance bond, below.

- H. Concrete Curb and Walk: Continuous observation of each concrete placement for curb and walk shall be made. Observe form support, form release agent, material placement, fiber reinforcing, shaping, finishing, jointing and application of curing material. Tests shall include examination of ticket for mix design, air content, slump and temperature and one set of 4 cylinders for each 25 cubic yards (500 linear feet of curb or 220 square yards of sidewalk) or fraction thereof for each day's placement. One cylinder shall be broken at 7 days, and two at 28 days with one as reserve. Confirmation that curing material is in place shall be made within 24 hours of the concrete placement.

No equivalent post-construction tests. See remedial tests and extended maintenance bond, below.

- I. Concrete Paving: For concrete observe form support and bond break, placement of dowel baskets and reinforcing, prewetting of subgrade, material placement, strike off and consolidation, finishing, jointing and application of curing membrane. Tests on concrete pavement shall include examination of ticket for mix design; determination of unit weight, air content, slump and temperature; and casting one set of 4 cylinders for each sample lot. A sample lot is the first 25 CY placed and each additional 400 CY or fraction thereof for each day's placement. One cylinder shall be broken at 7 days, and two at 28 days.

One cylinder shall be held in reserve.

No equivalent post-construction tests. See remedial tests and extended maintenance bond, below.

- J. Major Structures: Acceptance sample testing frequencies for Portland Cement Concrete for Bridges and Major structures: one set for approximately every 300 cubic yards concrete or as required for acceptance. Minimum of 1 set per job and class of concrete.

No equivalent post-construction tests. See remedial tests and extended maintenance bond, below.

1102.15 Remedial and Corrective Action

- A. Tests and Extended Maintenance Bond: Remedial Tests and Extended Maintenance Bond: If the required inspections, for which no equivalent post-construction tests exist, were not performed during the work the remedial tests and maintenance bond extensions listed below shall apply. The extension of the maintenance bond shall be in addition to the normal length of maintenance bond for new development.
1. Failure to observe embankment foundation has no remedial action. A one-year extension of maintenance bond shall apply. Amount of extended of maintenance bond shall cover cost of all work.
 2. Failure to observe and test curb and walk placement shall be abated by examination of finish, shape, presence of fiber reinforcing. A two-year extension of maintenance bond shall also apply. Amount of extended maintenance bond shall cover cost of all concrete curb and walk.
 3. Failure to make prepaving inspection or to observe paving operations in asphalt pavements shall be abated by conducting a falling weight deflectometer test at spacing not to exceed 100 feet along the each lane, alternating wheel paths. Analyze for pavement durability. Pavement durability shall meet or exceed 20 years. A two-year extension of maintenance bond shall also apply. Amount of extended maintenance bond shall cover cost of all asphalt pavements.
 4. Failure to make prepaving inspection or to observe paving operations in concrete pavements shall be ameliorated by sampling concrete cores at a spacing not to exceed 600 feet per lane, staggered, measuring pavement and base thickness, conducting a compressive strength test on the core, and visually confirming fiber content. Cores shall be replaced with road mix concrete. A two-year extension of the maintenance bond shall also apply. Amount of extended maintenance bond shall cover cost of all concrete pavements.
- B. Corrective Action for Failure of Concurrent Tests: If any part of the work fails a concurrent test, the contractor shall take action to correct the failed work and shall adjust methods and materials to avoid additional failures. Appropriate corrective action may include adjustment of forms, lines and grades, removal of rejected material from the job site, adjustment of mixes, postponing work until environmental conditions are favorable, moisture control of soil, tillage and recompaction of soil, stabilization of subgrade with rock or fly ash, identification and sealing of leaks, removal and replacement of work, or other actions as directed by the Construction Engineer.
- C. Corrective Action for Failure of Post-Construction Tests: If any part of the work fails a post construction alternative test or post construction remedial test, the Construction Engineer shall propose corrective

action for review by the County Engineer. Appropriate corrective actions may include removal and replacement of work, addition of asphalt overlays, diamond grinding for pavement smoothness, lining or spot repair of sewers manholes or inlets, negotiated payment to offset cost of accelerated maintenance and replacement by the Unified Government, or other actions as approved by the County Engineer. KDOT performance price adjustments for pavement thickness and smoothness may be a starting point for price negotiations.

END OF SECTION

TECHNICAL PROVISIONS

Section 2100

Clearing, Grubbing, Excavation and Site Preparation



Unified Government of Wyandotte County

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SECTION 2101 EXCAVATION, CLEARING, GRUBBING, AND SITE PREPARATION

2101.1 Scope

This section governs the furnishing of all labor, materials, and equipment for the performance of all clearing, grubbing, and demolition within the limits of work as shown on the Plans and in accordance with the Standard Drawings, the Specifications, and the Special Provisions.

2101.2 Referenced Standards

The following standards are referenced directly in this section. The latest version of these standards shall be used. If conflicting standards are referenced, the more stringent standard shall apply.

UG

2150	Erosion and Sediment Control
2201	Subgrade Preparation
2203	Aggregate Base Course
2307	Fencing
2700	Structures

ASTM

ASTM C 150	Standard Specification for Portland Cement
ASTM C 260	Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C 33	Standard Specification for Concrete Aggregates
ASTM C 494	Standard Specification for Chemical Admixtures for Concrete
ASTM C 618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM D 698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort
ASTM C 1602	Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
ASTM D 4318	Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D 4832	Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders

Kansas Department of Transportation

Standard Specifications for State Road and Bridge Construction, 2015 Edition
KDOT AB-3 Aggregate Base

1101.3 Permits

Unified Government permits that may be required for demolition are: haul permit for on road transport of rock, earth, or used building materials; oversized load permit for transport of oversized or overweight equipment or salvaged materials; burn permit for on-site burning of trees and brush; land disturbance permit if area of operations exceeds 1 acre; and blasting permit for use of explosives. Off-site disposal sites located in Kansas City, Kansas require permit from Unified Government building inspection.

2101.4 Definitions

The following terms have the meanings indicated:

- A. Clearing: Clearing shall consist of removing all vegetative matter such as trees, brush, down timber and other objectionable materials found on or above the surface of the site. It shall include removing buildings, fences,

lumber, waste dumps and trash and the salvaging of such materials as may be specified and disposing of the debris.

The Contractor shall not occupy any portion of the Project Site prior to the date established in the Notice to Proceed without prior approval of the Owner.

- B. Grubbing: Grubbing shall consist of removing and disposing of all vegetative matter such as stumps, roots, buried trees and brush encountered below the surface of the ground or subgrade, whichever is lower, which have not been included in Section 2101.4.A entitled "Clearing".

Trees to be removed shall be completely removed, including stump and large roots, unless such removal may result in damage to existing utilities. In that event, trees shall be sawn off not more than four (4) inches above the ground and the stump shall be removed to twelve (12) inches below finish grade.

In all cases of grubbing, the vegetative matter shall be removed to a minimum depth of 12 inches below ground line or subgrade, whichever is lower, except as provided in Section 2101.4.C.

When deleterious materials are encountered below ground line which may be detrimental to the proposed improvement, these materials shall be removed to a depth necessary to provide adequate support for the proposed improvement.

- C. Site Preparation: Site Preparation shall consist of all initial preparation work for the project site and includes, but is not limited to: steps to minimize site disturbance of existing vegetative, structures and private property; phasing and sequence construction activities into logical work zones; installation of erosion control measures; topsoil stripping, stockpiling and spreading; identifying haul roads, construction entrances and/or exits, construction parking areas; mailbox and fencing adjustments; etc. All site preparation shall be considered incidental unless such site preparation is listed separately in the Contract Documents.

- D. Demolition and Removal: This work shall consist of demolishing, removing, and disposing of all structures and improvements within the construction limits unless included in other items of work as shown on the Plans or in the Special Provisions. This work shall apply to all structures and improvements, whether on, above or below the surface of the ground or subgrade.

Demolition and removal shall include but not be limited to items such as buildings, drainage structures, pipes, pavements, fences, retaining walls, guard rails, and signs.

Items such as fences, drainage structures, streetlighting, signing and guard rails shall be salvaged and relinquished to the appropriate owner or relocated, where indicated on the Plans.

Relocation of signs, fences, guardrails, etc. shall be considered incidental to removal work except where such relocation is listed separately in the Contract Documents.

All pipes which are to be abandoned shall be removed unless otherwise shown on the Plans or approved by the Engineer.

- E. Trees: Vegetative growth 6 inches in diameter and larger, measured 3 feet above ground shall be classified as a tree.
- F. Brush: Vegetative growth less than 6 inches in diameter, measured 3 feet above ground shall be classified as brush.

2101.5 Construction

- A. Erosion and Sediment Control: Comply with Section 2150 Erosion and Sediment Control.
- B. Limits of Work: The limits for clearing, grubbing, and demolition shall extend to the construction limits unless otherwise shown on the Plans. Contractor shall do all clearing necessary for performance of their work and shall confine their operations to that area provided through easements, licenses, agreements and rights-of-way. The Contractor's entrance upon any lands outside of that area provided by easements, licenses, agreements or public rights-of-way, shall be at the Contractor's sole liability.

In the event construction limits have not been indicated on the Plans, the limits for clearing, grubbing, and demolition shall not extend beyond the limits of the Owner's property, right-of-way, or easements.

- C. Protection of Greenery, Existing Structures and Private Facilities: The Plans will designate trees, shrubs or other plants that are to be saved and the Contractor will take necessary steps to protect this greenery. All reasonable effort shall be made to save as many trees as possible. If trees can be saved by trimming, this shall be done in accordance with acceptable pruning practices. Trees may be pruned, upon prior approval of the Engineer, but only in accordance with the best practices of arboriculture in respect to the individual species with due regard to their natural form and growth characteristics.

Small Plants and Flowers: At least two weeks prior to the start of construction, property owners shall be notified by the Contractor of the proposed starting date. The purpose of this notification is so that the property owners can remove any small plants or flowers that they, the property owners, desire to save.

Existing structures within or adjacent to the construction limits that are not to be removed or demolished, shall be protected by the Contractor during their construction. Any private facilities such as house sewer laterals which are disturbed or damaged by the Contractor's work, shall be repaired by the Contractor prior to the close of the work day. This repair shall be made in a manner sufficient to restore utility service to that property. Restoration of utilities damaged by the Contractor shall be restored as directed by the utility company at no additional cost to the Owner. Unless otherwise provided in Basis of Payment no separate or additional payment will be made for any work in connection with removal, relocation or restoration of obstructions and existing facilities.

- D. Surface Obstructions: Natural obstructions, existing facilities and improvements encountered during site preparation shall be removed, relocated, reconstructed or worked around as herein specified. Care shall be used while performing site preparation work adjacent to any facilities intended to remain in place. Except as otherwise specified, the Contractor shall be responsible for any damage to existing facilities and improvements and any repairs required shall be promptly made at the Contractor's expense. Waste materials shall be disposed of in a satisfactory manner off the work site.
- E. Surface Obstructions for Pipeline Trenches: Sidewalks, curb and gutter, drainage structures and similar obstructions shall be tunneled under if tunneling is best suited, otherwise the obstruction shall be cut in straight lines or removed to the nearest construction joint if located within five feet of the center-line of the trench. In no case shall the joint or line of cut be less than one foot outside the edge of the trench. Surface obstructions removed to permit construction shall be reconstructed as specified and to the dimensions, lines and grades of original construction.
- F. Embankment Areas: When undisturbed stumps and roots are encountered where the fill depth will exceed 3 feet, the stumps and roots may be left in place provided they do not extend more than 3 inches above the original ground line.
- G. Borrow Areas: All stumps, roots and other objectionable matter shall be removed from the borrow material

used for embankment or fill. The borrow area shall be left in a well-drained and smooth condition.

- H. Backfilling the Site: All trenches, holes, pits, and basement areas resulting from the operations of clearing, grubbing, demolition and removal on the site, shall be backfilled with suitable material placed and compacted in conformance with applicable sections of these specifications.
- I. Disposal of Materials: All materials with the exception of those which are designated for salvage or which are used in the embankment in conformance with this specification, shall become the Contractor's property and shall be disposed of by Contractor, outside the project limits at a site as approved by the Owner, unless otherwise indicated on the Plans. The disposal of waste and excess excavated materials, including hauling, handling, grading, and surfacing shall be a subsidiary obligation of the Contractor.
- J. Hazardous Materials
 - 1. In the event hazardous waste as defined by the Resource Conservation and Recovery Act of 1976 (PL94-580) are encountered, work shall be halted and the Owner shall be notified. Work shall be resumed only after the Owner notifies the Contractor. Regulation of removal, handling and disposal of hazardous wastes is the responsibility of Federal and State agencies.
 - 2. All other items classified as "hazardous" shall be disposed of in accordance with the applicable codes. The Contractor shall refer to Section 2150 entitled "Erosion and Sediment Control".
- K. Items to be Left in Place: In removing items such as concrete pavements, curbs, curb and gutter, sidewalks and similar objects where portions of these objects are to be left in place they shall be removed to an existing joint or a new joint, sawed to a minimum depth of 2 inches or $\frac{1}{4}$ the slab thickness, whichever is greater. This joint shall be to true line and vertical face. Sufficient portions of such items shall be removed to provide the proper grade and connection to the new work.
- L. Mailboxes: Mailboxes shall be maintained in the manner that the Postal Service requires to prevent interruption of mail delivery.
- M. Fences: Refer to Section 2307 for fencing.
- N. Property Pins: The Contractor shall preserve all property corners, pins or markers. In the event any property corners, pins, or markers are removed by the Contractor, such property points shall be replaced at the Contractor's expense and shall be reset by competent surveyors properly licensed to do such work. In the event such points are section corners or Federal land corners, they shall be referenced and filed with the appropriate authority.
- O. Subsurface Obstruction of Pipeline Trenches: Where existing utilities and service lines are to be encountered, the Owner thereof shall be notified by the Contractor at least 48 hours (not including weekends and/or holidays) in advance of performing any work in the vicinity. All excavation, pipeline installation and backfilling work in the vicinity of such utilities shall be accomplished in the manner required by the respective Owner and, if requested, under their direct supervision. The Contractor shall be responsible for any and all damages to a public or private utility that may occur as the result of the construction.

The Contractor shall make a reasonable effort to ascertain the existence of obstructions and shall locate obstructions by digging in advance of machine excavation where definite information is not available as to their exact location. Where such facilities are unexpectedly encountered and damaged, responsible officials and other affected utilities shall be notified and arrangements made for the prompt repair and restoration of service.

SECTION 2102 GRADING

2102.1 Scope

This section governs the furnishing of all labor, materials, and equipment required to excavate, place, remove, dispose or compact materials encountered within the limits of the project as shown on the Plans and in accordance with the Standard Drawings, the specifications, and the Special Provisions.

2102.2 Definitions

The following terms have the meanings indicated:

- A. Grading: Grading as used herein shall mean the performance of all excavation, embankment, and backfill in connection with the construction of all improvements.
- B. Excavation: Excavation is defined as the removal of materials from the construction area to the lines and grades shown on the Plans and includes trenching for pipelines, utilities, and structures.
 - 1. Unclassified Excavation: Unclassified excavation is defined as the removal of all material encountered regardless of its nature. All material excavated will be considered as Unclassified Excavation unless otherwise specified in the Contract Documents.
 - 2. Rock Excavation: Rock excavation is defined as the removal of all rock ledges 6 inches or more in thickness, and detached rock or boulders having a volume of more than 1 ½ cubic yards and shale occurring in its natural state, hard and un-weathered.
 - a. A rock ledge is defined as a continuous body of rock which may include thin interbedded seams of shale or other soft materials less than 12 inches thick. The vertical limit of each ledge shall be defined by interbedded seams of soft materials 12 inches or more in thickness. The beds of soft interbedded material 12 inches or more in thickness shall not be included in the measurement for "Rock Excavation" but shall be included in the measurement for "Earth Excavation".
 - b. The following items shall not be considered as rock excavation: soft or disintegrated rock or flowable backfill (CLSM) which can be removed with a pick or digging machine; loose, shaken or previously blasted rock; broken stones and rock which may fall into the trench from outside the limits of excavation.
 - c. When solid rock (including non-diggable flowable backfill (CLSM)) is unexpectedly discovered, the Contractor shall notify the Owner.
 - 3. Earth Excavation: Earth excavation is defined as the removal of all material not defined as rock.
 - 4. Trench Excavation: Trench excavation is defined as excavation to the width and depth as necessary to lay the pipe to the grade line as indicated on the Plans and in the specifications.
 - 5. Tunneling, Boring and Jacking: Includes all underground horizontal excavations necessary to install the pipeline to the grade line as indicated on the Plans and in the specifications.
- C. Trench Foundation: The area at the bottom of the excavation shall be composed of a stable material capable of supporting the placement of bedding material, pipe, or structures.

D. Unstable Foundation: Materials encountered in the bottom of the trench deemed as unsuitable by the Engineer to afford a sufficiently stable pipe foundation.

E. Flowable Backfill / Controlled Low Strength Material (CLSM): A mixture of portland cement, fly ash (optional), fine aggregate, water, and admixtures (as approved by the Engineer) proportioned to a consistency to fill voids without vibration. Flowable Backfill (CLSM) shall consist of:

1. Cement: The portland cement shall conform to ASTM C 150, Type 1 or Type II.
2. Fly ash: Fly ash, when used, shall conform to the requirements of ASTM C 618 Class C or F.
3. Fine Aggregate: Fine aggregate shall conform to ASTM C 33.
4. Mixing Water: Mixing water shall conform to ASTM C 1602.
5. Admixtures: Air entrainment, when used, shall conform to ASTM C 260. Water reducing admixtures, when used, shall conform to ASTM C 494. All other admixtures shall only be used when approved by the Engineer.
6. Other materials: Proposed replacement or supplementary materials shall be approved by the Engineer and in conformance with current NRMCA or ACI guidelines for CLSM.

Flowable Backfill (CLSM) compressive strength testing results are required for approval of mix design prior to placement of flowable backfill. Compressive tests are to be conducted at 7 and 28 days in accordance with ASTM D 4832. CLSM shall have a minimum and maximum 28-day design compressive strength of 50 psi and 125 psi, respectively. The unit weight of the CLSM shall be a minimum of 125 lbs. per cubic foot (pcf). All tests necessary for determining conformance with the requirements specified herein will be at the Contractor's expense.

F. Bedding: The placing and compacting of the aggregate material above the stable foundation and below the pipes or structures.

G. Embedment: The placing and compacting of approved material surrounding the pipe up to a maximum of 12-inches above the top of pipe.

H. Embankment or Backfill: The placing and compacting of approved material in the construction areas to the lines and grades shown on the Plans.

1. Unsuitable Material: Muck, frozen material, organic material, topsoil, or rubbish. Rock with a maximum dimension greater than 24 inches is also defined as unsuitable. Topsoil is unsuitable for embankment and backfill but may be used as the surfacing for graded areas to be seeded or sodded (see Section 2400).
2. Suitable Material: Suitable material is defined as entirely imperishable with that portion passing the No. 40 Sieve having a liquid limit not exceeding 40 and a plastic index not exceeding 25, when tested in accordance with ASTM D 4318.
 - a. Rock Embankment: Material for rock embankment shall be free of unsuitable material and shall contain, by volume, greater than 10 percent rock or gravel having a maximum dimension greater than 3 inches but not greater than 24 inches.
 - b. Earth Embankment: Material for earth embankment shall be free of unsuitable material and shall, contain by volume, less than 10 percent rock or gravel having a maximum dimension

greater than 3 inches.

3. Pipe Backfill: Pipe backfill materials shall be furnished and installed to complete the work shown on the Plans or as called for in the Contract Documents.
 - a. Select Earth Backfill Material: Select earth backfill shall be finely divided job excavated material free from debris, organic matter, rocks larger than one (1) inch and/or frozen materials.
 - b. Other Earth Backfill: Other backfill may be job excavated material free from debris and organic matter. No rock greater than three-inches in diameter shall be placed in any trench excavation as backfill unless approved by the Engineer.
 - c. Aggregate Backfill Material: Approved material meeting ASTM C33 requirements and the specified gradations.
 - d. Flowable Backfill (CLSM): See Section 2102.2.E.
- I. Borrow: Approved material excavated from an area outside of the project limits and required for the construction of the embankment.
- J. Waste: Waste is defined as excavation material not used in the embankment and disposed of outside of the embankment areas.
- K. Structures: Used herein refers to culverts, storm sewer and/or sanitary appurtenances, and similar construction. See Section 2700 for other structures.

2102.3 Construction

- A. The Contractor shall adhere to any and all statutes regarding the notification of utilities prior to beginning any work within public right-of-way. The relocation and/or protection of any utility that is shown on the Plans, that lies within a utility easement and is endangered by this construction shall be the responsibility of the Contractor.
- B. The Contractor shall make every reasonable effort to protect private facilities. These facilities may not be shown on the Plans. When these facilities are disturbed or damaged by the work, the Contractor shall make necessary arrangements for repairs to the facilities for continuous service prior to the close of that workday.
- C. It shall be the responsibility of the Contractor to protect all property lot corners and control monumentation. Should it be necessary to disturb any such monument, whether stake, pin, bar, disk, box, or other, it remains the responsibility of the Contractor to reference such markers prior to removal, reset them, and file such relocations or monumentation documents as the law may require. Any such references, removal, replacement and certification of monuments shall be performed by a registered licensed surveyor. A copy of all such certification documents shall be provided to the Owner prior to final payment. Any monument destroyed or improperly reset by the Contractor may be replaced by the Owner to the standards required by law at the expense of the Contractor.
- D. Grading, excavation, and backfilling for all improvements, shall be made to the lines, grades, and cross sections indicated by the Plans.
- E. In addition, to any erosion control measures shown on the Plans, the Contractor shall schedule and conduct their operation in such a manner and shall provide any necessary control facilities to protect downstream and adjacent properties from pollution, sedimentation, or erosion caused by the grading operations. Any pollution or damage occurring shall be the responsibility of the Contractor. See Section 2150 Erosion and Sediment

Control.

- F. During construction, the graded area shall be maintained by the Contractor in such condition that it will be well drained at all times. Roadway ditches, channel changes, inlet and outlet ditches and other ditches in connection with the roadway shall be cut and maintained to the required cross section. All drainage work shall be performed in proper sequence with other operations. All ditches and channels shall be kept free of debris or obstructions not identified in the erosion control plan.
- G. All suitable material removed by excavation shall be used as far as practicable in the formation of embankment as required to complete the work. The Contractor shall sort all excavated material and stockpile when necessary, so as to provide suitable materials for embankments.
- H. After removal of the roadway excavation material to the required section, all material between lines 1 foot outside of the curbs and within the top 6 inches of the subgrade shall be compacted to 95 percent of maximum density for the material as defined in Section 2102.6.F.
- I. Rock encountered within the full width of the roadway, toe of slope to toe of slope, shall be undergraded to an elevation of 6 inches below the finished subgrade elevation. Care shall be taken to avoid overshooting when blasting. Rock shall be removed in such a manner as to leave no excessive water pockets in the surface.
- J. Blasting: When blasting is permitted, the Contractor shall use the utmost care to protect life and property. The Contractor shall obtain any required permits from the agency having site jurisdiction and shall comply with all laws, ordinances, and the applicable safety code requirements and regulations relative to the handling, storage and use of explosives and protection of life and property, and he shall be responsible for all damage caused by his or his subcontractor's operations. The contractor shall meet the following requirements:
 - 1. Permit: Blasting permits are required for every project using explosives. Permits for storage and use of explosives shall be applied for at the Unified Government's Fire Prevention office. If requested additional permits may need to be obtained from the Unified Government's Engineers office. Documents required for processing permits include but may not be limited to:
 - a. Certificate of Insurance for Catastrophic Coverage - A certificate separate from the one covering the work as a whole will be required. The insurance limit will be a minimum of \$5,000,000.00. Based on the location of the proposed blasting, the limit may be increased, so consultation with the Unified Government Engineer's office prior to application is encouraged. The specific language requirements for insurance certificates contained in the General Conditions shall apply.
 - b. Blasting Bond - The amount of bond is the maximum amount established in the UFC, \$100,000.00
 - c. Blaster and User license issued by the State of Kansas
 - d. Blaster and User business license issued by the Unified Government
 - e. Pre-blast surveyPermits shall be kept on site for the duration of blasting operations.
 - 2. Pre-Blast Survey: The contractor shall obtain a pre-blast survey. Preblast survey shall be conducted by an independent, neutral blasting consultant who regularly performs preblast surveys. Two copies of the signed written summary shall be submitted to Engineer.

Preblast survey shall record photographic and verbal documentation of preblast damage to the exterior and interior of structures within 300 feet of the proposed blast points. Verbal documentation may be either written text or audio tape, with written transcripts as required by Engineer to evaluate

claims. Minimum photographic record shall be digital format, with a minimum of 8.0 mega pixel sensor size. Submit digital files as required by Engineer to evaluate claims. Transcript and files requested by Engineer to evaluate claims shall be supplied at no additional cost to the Unified Government. Survey records shall be kept on file by the blasting consultant for a minimum of 5 years.

If access to the interior of buildings is denied, the survey record shall contain a returned certified letter to the tenant or owner of the building as proof of attempts by the blasting consultant to gain entry. Letter shall explain the purpose of the survey and have attached the survey and signed denial of access statement, which clearly represents the purpose of the preblast survey and explains the contact procedure with the blasting consultant.

3. Protection of Existing Structures: Minimum protection from noise, flyrock, and ground vibration is described below. Contractor shall take whatever additional protective measures he deems necessary.
 - a. Noise: No building shall be exposed to a peak sound level in excess of 130 dB, when measured by instrument with a low frequency limit of 6 hertz or lower.
 - b. Flyrock: No flyrock shall leave the construction limits. Overburden or blasting mats shall be used where necessary to prevent unsafe conditions.
 - c. Ground Vibration: Ground vibrations shall be monitored by a seismograph located at the nearest building (or if the nearest building is distant, the seismograph may be located at a reasonable distance from the blast in the direction of the nearest building). Seismographs used for monitoring ground vibrations shall record peak particle velocity and frequency in 3 mutually perpendicular directions.

The peak particle velocity shall not exceed 1.0 inches/second for frequencies greater than 11 hertz, and shall not exceed 0.50 inches/second for frequencies of 11 hertz and less.

4. Safety: Blasting operations shall be conducted by the blaster(s) named in the permit. Storage, transportation, handling, use, and disposal of explosives shall conform to the requirements of the UFC.
5. Blasting Records: The blaster shall retain a record of blasts for a minimum of 5 years. Upon request, these records shall be made available to Engineer or the public for review. Records shall contain the company name of the contractor doing the blasting; the location, time, and date of blast; the name, signature, and certification number of the blaster; type of material blasted; type of explosive; total weight of explosive detonated in an 8 millisecond period; sketch of blast area including number, diameter and depth of holes, burden, spacing, delay pattern; initiation system; mats or other protection; identity, distance, and direction of the nearest building; noise and seismic records.

No blasting shall be performed without the meeting the appropriate criteria above.

- L. No Blasting Areas: No blasting of any kind for rock excavations or any other purpose will be allowed unless noted otherwise on the Plans or permitted by the Unified Government Fire Prevention Office.
- M. Areas of undergrading or overbreakage in rock between lines 1 foot outside of the curbs shall be backfilled with spalls, rock fragments or a granular type material. Backfill materials shall have a plasticity index not to exceed 10 and a gradation such that at least 50 percent of the material will be retained on the No. 4 Sieve.
- N. Cribbing and Sheeting: The Contractor shall furnish, install, and maintain such sheeting, bracing, and other components, as may be required to support any excavation and to prevent any movement which could in any way injure or delay the work or endanger adjacent pavement, building, or other structures. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and

consolidated.

For the purpose of preventing injury or property damage, Contractor may leave in place all sheeting or bracing, and other items to be embedded in the backfill of the trench. No sheeting or bracing, however, shall be left in place within 5 feet of the surface without the written permission of the Engineer.

2102.4 Excavation, Trenching, And Backfilling For Pipe And Structures

A. Dewatering of Excavation

1. The Contractor shall maintain a dry and stable excavation, obtain necessary permits, and provide for the proper method of discharging water from the work site at all times until installation is completed.
2. The Contractor shall not allow hydrostatic pressure flotation or other adverse effects to cause damage to the structure or pipeline.
3. Proper dewatering techniques are the Contractor's responsibility. All work performed by the Contractor that is adversely affected by his/her failure to adequately dewater trenches will be subject to rejection by the Engineer. The Contractor shall repair and/or replace affected structures or pipelines.
4. The Contractor shall remove any water that may accumulate or be found in the trenches and other excavations made as part of the work.
5. Grading shall be done to prevent surface water from flowing into trenches or other excavations, and to maintain the flow of water in natural watercourses on or adjacent to the site. Any water accumulating in trenches or other excavations shall be removed by pumping or by other approved methods.

B. Trench Excavation: Trenches shall be excavated to the width and depth as necessary to lay the pipe to the grade line as indicated on the Plans with proper pipe embedment. The Contractor shall perform excavation of materials encountered in accordance with Section 2102.3, regardless of material type, to the depths indicated on the drawings or as otherwise specified herein. Excavated materials are to be deposited beside trenches and excavations to avoid overloading, and to prevent slides or cave-ins, transported to the spoil banks, or used for backfilling. All excavated materials not required or not suitable for backfill shall be removed and disposed of off the site by the Contractor as part of the Work. The trench excavation opened at one time shall be limited by the nature of the soil and other safety considerations.

1. All pipeline excavation work shall be accomplished under the supervision of a person employed by the Contractor or his subcontractor and experienced with the materials and procedures which will provide protection to existing improvements, including utilities and the proposed pipeline.
2. The alignment, depth, and pipe subgrades of all trenches shall be determined by a laser beam parallel to the pipe invert.
3. Deviation from the indicated alignment will not be permitted except under special circumstances, subject to approval of the Engineer.
4. Trenches that are parallel to structures, pavements or walls shall be no closer than 18 inches from the closest edge of footings or pavement. Also, no parallel trench shall extend in depth below a plane having a downward slope of 1 horizontal to 2 vertical starting from a line 9 inches above the bottom edge of footings or pavement. The bottom of pavement shall be the lowest improved section of pavement to include chemically stabilized subgrade or aggregate base layers.

5. When pipe is to be installed in embankment or fill, the embankment shall be constructed in accordance with Section 2102.6 and shall be built up to a plane at least 18 inches above the top of the pipe prior to the excavation of the pipe trench.
 6. The Contractor shall not open more trench in advance of pipe laying than is necessary. Four hundred (400) feet will be the maximum length of open trench allowed on any line under construction. All open trenches shall be adequately protected.
 7. Undercutting of trench walls is not permitted.
 8. Option to Trenching: Contractor may perform excavation by tunneling methods as set forth herein at no additional cost to the Owner provided prior written approval for each such location is obtained from the Engineer. The Contractor shall submit to the Engineer, prior to actual work, a written description of his proposed operation. It shall include the types and locations of shafts, methods to provide safe support strength for the pipeline when the shafts or bore pits exceed maximum allowable trench widths and other features that would affect the pipeline. Tunneling shall be done with a minimum inconvenience and disturbance to the general public and abutting property owners.
- C. Trench Widths: Trenches shall be excavated to a width that will provide adequate working space and pipe clearances for proper pipe installation, jointing, and embedment. Over-excavation shall be replaced with granular bedding material or flowable backfill (CLSM). See applicable Plans, Standard Drawings, and manufacturers' recommendations for trench widths for pipe installations.
- D. Preparation of Pipe Subgrade: Pipe subgrade shall be prepared to provide uniform and continuous support of pipe. The trench bottom shall be evenly graded. Areas that are too high shall be shaved as required. Any portions of the trench that are found to be too low shall be filled with suitable materials, thoroughly compacted, and brought to true grade, allowing for placement of bedding material as shown in the Standard Drawings.
- E. Trench Bottom in Rock Excavation: Where rock is encountered in excavation, the rock shall be removed to provide a minimum clearance of 6 inches below and 6 inches along each side of the pipe.
- F. Replacement of Unsuitable Pipe Foundation Material
1. If unstable subgrade conditions are encountered and it is determined by the Engineer that the excavation bottom will not provide suitable support, the Contractor shall remove all unstable or unsuitable material over the entire width of the trench to the depth required by the Engineer to provide a stable foundation. Removal shall not be less than 6 inches.
 2. Materials so removed shall be replaced with bedding aggregate material as specified herein. Bedding material shall be mechanically compacted over the entire width of the trench and shall be brought to proper grade, shape, and elevation for the installation of the pipe as shown on the Plans or Standard Drawings.
- G. Granular Bedding Materials: Granular bedding material shall meet ASTM C33 with one of the following gradation requirements:

Sanitary Sewer Bedding Material Gradation Limits (% Passing)	
Sieve Size	3/4"
1"	100

3/4"	90 – 100
3/8"	20 – 55
No. 4	0 – 5
No. 8	0 – 2

Storm Sewer Bedding Material Gradation Limits (% Passing)			
Sieve Size	3/4"	1/2"	3/8"
1"	100		
3/4"	90 – 100	100	
1/2"		80 – 100	
3/8"	20 – 55	40 – 77	100
No. 4	0 – 10	0 – 15	30 – 40
No. 8	0 – 5	0 – 5	0 – 4

H. Pipe Embedment: All sanitary sewer and storm sewer pipe shall be bedded in bedding aggregate as specified herein.

1. Bedding shall cover the entire width of trench.
2. The first layer of bedding placed on the bottom of excavation shall be in accordance with Figures 1 through 3.
3. Bedding at bottom of trench, in the middle 1/3 of trench under the pipe shall be loose.
4. After pipe is placed, bedding material shall be placed in layers in accordance with manufacturer's recommendations.
5. Second layer of bedding material shall be placed under the lower haunches of the pipe up to the springline (center of pipe). Material shall be spaded to be place under haunches and compacted at the springline elevation prior to placing additional bedding material.
6. The third layer of bedding material shall be placed to 12 inches over the top of pipe.
7. Contractor shall take measures to prevent pipe from floating during placement of bedding material so that pipe maintains proper line and grade as shown on the Plans.

I. Trench Backfill

1. Backfill shall not be placed when material contains frost, is frozen, or a blanket of snow prevents proper compaction.
2. The Contractor shall remove from the project site waste material, trees, organic material, rubbish, or other deleterious materials.
3. All trash and debris shall be removed from the pipeline excavation prior to backfilling.
4. Backfill material shall be carefully placed to avoid damage to or displacement of the pipe, other utilities or structures.
5. Unless otherwise specified, all trenches and excavations around structures shall be backfilled to the

original ground surface.

6. Outside of paved areas, the backfill material shall be placed in layers not exceeding 8-inches in loose thickness and be compacted to at least 90% of maximum density. Compaction testing shall be at the discretion of the Engineer.
7. The method of compaction and the equipment used shall be appropriate for the material to be compacted and shall not transmit damaging shocks to the pipe.
8. The combination of the thickness of the layer, the method of compaction and the type of compaction equipment used shall be at the discretion of the Contractor subject to obtaining the required densities.

J. Trench Backfilling in Street or Alley Right of Way and under Pavement

1. Narrow Trench: Suitable backfill material for trenches 24 inches or less in width and shall be flowable backfill (CLSM).
2. Standard Trench: Suitable backfill material for trenches between 24 to 48 inches wide shall be either flowable backfill (CLSM) or dense, well-graded aggregate base material. Aggregate base material shall meet the requirements for KDOT AB-3.
3. Wide Trench: Suitable backfill material for trenches greater than 48 inches wide shall be either flowable backfill (CLSM) or dense, well-graded aggregate base material. Aggregate base material shall meet the requirements for KDOT AB-3.
4. Suitable Backfill Material outside of paved areas within Right of Way, and all areas outside Right of Way, may be suitable material as specified for "Earth Embankment" in Standard Specifications, Section 2102.2.H. Suitable Backfill Material may also be other trench backfill material (flowable backfill or aggregate base) depending on site conditions, trench widths or at the direction of the Engineer.
5. Aggregate backfill material placed between lines one foot behind curbs, or edge of uncurbed pavement, shall be meet density and testing requirements as outlined in Section 2203 Aggregate Base Course.
6. The method of compaction and the equipment used shall be appropriate for the material to be compacted and shall not transmit damaging shocks to the pipe.
7. Backfill shall be place in compacted in layers not exceeding 8-inches in loose thickness and be compacted to at least 95% of maximum density at optimum moisture $\pm$ 3% as determined by ASTM D 698. Each lift shall be compacted and tested to the required density prior to the next lift being placed. Testing shall be performed by a qualified testing lab hired by the Contractor and approved by the Owner.
8. A minimum of one compaction test shall be taken for each lift of earth embankment backfill or dense, well-graded aggregate base material for each road crossing or each 50 feet of trench length under pavement.
9. Testing shall be performed by a qualified testing lab hired by the Contractor and approved by the Owner.
10. Laboratory compaction test and index property test results for each material used on site shall be

submitted to the Engineer prior to construction. Any work by Contractor prior to test submittals and subsequent Owner review and approval shall be work done at the Contractor's risk.

11. Test reports shall be submitted to the Engineer daily. The reports shall clearly indicate the location of all tests by street name, station and/or lot number, type of backfill material, utility type, and depth of test. The reports shall include the results of all tests (pass or fail) and all re-tests.
12. All test reports shall be submitted prior to receiving approval of subgrade for curb and pavement installation. Pavement, curb or other surface features placed prior to receiving subgrade approval shall be placed at the Contractor's risk.

K. Flowable Backfill (CLSM) Installation

1. Flowable Backfill (CLSM) shall be constructed to the configuration and the lines and grades shown on the Plans, or as directed by the Engineer. No additional payment will be allowed for placement beyond these limits.
2. The producer may cut back on the quantity of water incorporated during batching with the approval of the Engineer. Additional water may be added on-site to achieve the intended consistency. The final mix unit weight and compressive strength shall fall within the specified ranges as described in Section 2102.2.E.
3. No Flowable Backfill (CLSM) shall be placed on frozen ground or in standing water.
4. When the ambient temperature is either falling or forecasted to fall below 35° F within 24 hours of its proposed placement time, the Contractor may submit the use of cold weather methods for approval by the Engineer.
5. Care shall be taken to prevent the movement of any conduit, pipe or structure from the designated location or intrusion of flowable backfill into undesirable locations. If such movement or intrusion occurs, the Engineer may require the affected structure to be excavated and replaced to the proper grade at the Contractor's expense.
6. If flowable backfill is placed in more than one layer, loose and foreign material shall be removed prior to placing the next layer.
7. No flowable backfill shall be covered or accepted until a minimum compressive strength has been attained, as demonstrated by failure to deform or crush underfoot. If the flowable backfill does not harden to required strength, the flowable backfill shall be removed and replaced with an acceptable material at the Contractor's expense. Acceptance of the flowable backfill shall be based on visual inspection.
8. Random compressive strength testing may be conducted at the Owner's expense to verify compliance with strength requirements. Compressive tests shall be in accordance with ASTM D 4832.

L. Trench Checks

1. Install where shown on the Plans.
2. The backfill above the trench check shall meet the specifications for backfill material.

- M. Excavation by Tunneling or Boring: Where depth of trench and soil conditions will allow it, tunneling may be required under pavement, railroad tracks, or other surface structures. Tunnel sections shall provide adequate clearance for pipe and workers for proper lining, grading, and jointing the pipe installed therein.

All tunnel excavation shall provide an excavation conforming to the outside diameter of the casing and/or carrier conduit. The excavation shall be to an alignment and grade which will allow the carrier conduit to be installed to proper line and grade as shown on the Plans and as established in Section 2505.2.H. Conduct excavation in a manner to prevent disturbing overlying and adjacent material. Perform dewatering and chemical soil stabilization or grouting if necessary, due to existing field conditions.

- N. Settlement: The Owner may perform periodic inspections to ensure that no settlement has occurred. The Contractor shall be responsible for all settlement of backfill, fills and embankments which may occur within two (2) years of time after final acceptance of the contract under which the work was performed.

The Contractor shall make, or cause to be made, all repairs or replacements made necessary by settlement within thirty (30) days after notice from the Owner. Should the Contractor fail to make such repairs the Owner may cause repairs to be made and the cost of these repairs shall be the responsibility of the Contractor.

- O. Excavation and Backfilling for Piping and Structures

1. All structure foundations shall be founded on stable, undisturbed subgrade. Excavation shall be sufficient to provide at least 12 inches clear between the outer surfaces of the structure (including formwork) and the embankment or timber that may be used to hold and protect the excavation.
2. Unsuitable or unstable foundation soil that will not properly support the structure, as determined by the Engineer, shall be removed to the depth required and the excavation backfilled to the proper grade with compacted bedding material or other material approved by the Engineer.
3. All excavations for structure shall be kept dry; no reinforcing steel shall be installed in water; and no water shall be permitted to inundate the reinforcing steel before concrete has been placed.
4. Street Right-of-Way Areas: All structures located under or within paved or graveled areas shall be backfilled with flowable backfill (CLSM) to a level flush with the top of pavement subgrade. Structures located under or within vegetated areas shall be backfilled with flowable backfill (CLSM) to a level twelve inches below finish grade and consolidated topsoil. The external opening surfaces of weep holes shall be covered with hardware cloth and surrounded with a minimum of three cubic feet of consolidated granular bedding material.
5. Areas other than Street Right of Way: All structures located under or within paved or graveled areas shall be backfilled with flowable backfill (CLSM) to a level flush with the top of pavement subgrade. Structures located under or within vegetated areas shall be backfilled with CLSM, untreated compacted aggregate, consolidated granular bedding material, or compacted soil to a level twelve inches below finish grade. The external opening surfaces of weep holes shall be covered with hardware cloth and surrounded with a minimum of three cubic feet of consolidated granular bedding material. The top twelve inches shall be backfilled with topsoil.
6. Backfilling
 - a. No backfill shall be placed over or around any structure until the concrete or mortar therein has attained a minimum strength of 2000 psi and can sufficiently support the loads imposed by the backfill without damage.

- b. The Contractor shall use utmost care to avoid any wedging action between the side of the excavation and the structure that would cause any movement or floating of the structure. Any damage caused by premature backfill or by the use of equipment on or near a structure will be the responsibility of the Contractor.
- c. Backfill shall be placed and compacted on all sides of the structure simultaneously, and operations shall be so conducted that the backfill is always at approximately the same elevation on all sides of the structure.
- d. No excavated rock larger than 3 inches maximum dimension shall be placed within 1 foot of the exterior surface of any structure except as allowed with flowable backfill (CLSM) placement.
- e. No backfill material containing rock, or detritus from rock excavation, shall be placed in the upper 24 inches of the excavation.
- f. Large rock may be placed in the remainder of the backfill upon approval of the Engineer. Approved rock material shall be placed so that it is well separated, allowing proper compaction of soil backfill around the rock material.
- g. All excavation shall be backfilled to the lines and grades shown on the Plans.
- h. After the required curing time, backfill shall be placed and compacted in layers. Contractor shall monitor impact of placement, vibration and related work so not to damage or disturb structures.
- i. Backfill shall be placed in compacted in layers not exceeding 8-inches in loose thickness and be compacted to at least 95% of maximum density at optimum moisture $\pm$ 3% as determined by ASTM D 698. Each lift shall be compacted and tested to the required density prior to the next lift being placed. Testing shall be performed by a qualified testing lab hired by the Contractor and approved by the Owner.
- j. In no instance shall backfill be dumped, bulldozed, or otherwise deposited in bulk upon the newly constructed structure.

P. Backfill of Drainage Course Crossings

- 1. Excavation in rock to a distance of 10 feet beyond each bank (measured perpendicularly to the stream flow) shall be backfilled with concrete to the existing rock elevation. The excavation above the rock elevation shall be backfilled with soil above that concrete encasement or as indicated on the Plans. The soil placed above the encasement shall be compacted to at least 95% of maximum density at optimum moisture $\pm$ 3% as determined by ASTM D 698.
- 2. Pipe placed in an excavation in soil shall be encased in concrete to a minimum of 1 foot above and below the pipe and backfilled with soil above that concrete encasement or as indicated on the Plans. The soil placed above the encasement shall be compacted to at least 95% of maximum density at optimum moisture $\pm$ 3% as determined by ASTM D 698.

2102.5 Undergrading

- A. Where materials are encountered which are deemed as unsuitable by the Engineer for use in the work, they shall be removed to the depth and limit as ordered by the Engineer. Areas undergraded shall be backfilled with one of the following materials:
 - 1. Replacement with suitable materials from excavation on the work site or from an off-site borrow area, compacted to the required moisture and density requirements where practicable.
 - 2. Mixing of stone base or rock materials, hydrated lime, portland cement or fly ash into the sub-grade.

3. Placement of compacted aggregate.
4. Rock fragments or spalls. A granular type material having a plasticity index not to exceed 10 and a gradation such that at least 50 percent of the material will be retained on the No. 4 Sieve and not more than 40 percent will pass the No. 10 Sieve.
5. A material meeting the requirements of Section 2102.2.H.2.

2102.6 Embankment

- A. This section governs embankment for all improvements. The embankments shall be constructed using suitable materials, as herein defined, procured from excavations made on the project site or from borrow areas as required to complete the grading work.
- B. Starting the Embankment: Where embankments, regardless of height, are placed against hillsides or existing embankments, either of which have a slope steeper than 1 vertical to 4 horizontal, the existing slope shall be benched or stepped in approximately 24 inch rises as the new fill is brought up in 8 inch maximum layers or lifts. The material bladed out, the bottom of the area cut into, and the embankment material being placed, shall be compacted to the required density. Material cut out, bladed into place and compacted shall not be measured and paid for directly but will be considered as incidental work.

The existing surface upon which embankment material is to be placed shall have all unstable and unsuitable material removed before starting the embankment work. Where embankments 2 feet or less in depth are to be placed on areas covered by existing pavement, the existing pavement shall be removed and the cleared ground surface shall be compacted to the specified density. Where embankments greater than 2 feet in depth are to be placed on areas covered by existing pavement, the existing pavement shall be broken into pieces no larger than 18 inches maximum dimension, left in place and the embankment started thereon.

- C. Placing Earth Embankment: Earth shall be placed in successive horizontal layers distributed uniformly over the full width of the embankment area. Each layer of material shall not exceed 8 inches maximum in thickness (loose state) and shall be compacted to not less than the required density before the next layer is placed thereon. As the compaction of each layer progresses, continuous blading, or dozing will be required to level the surface and to ensure uniform compaction. Embankment construction shall not be performed when material contains frost, is frozen or is snow covered.
- D. Placing Earth and Rock Embankment: When earth and stone or rock fragments are mixed in the embankment, all stones or rock fragments exceeding the thickness of the compacted lift shall be disposed of by being incorporated into the embankment outside the limit of the proposed paved areas. The thickness of the layer in these areas may be increased if necessary to accommodate the rocks, but shall not exceed 12 inches in thickness (loose state). The stones or rock fragments are to be placed so there will be no nesting.
- E. Consolidated Rock Embankment: When the excavated material consists predominantly of stone or rock fragments of such size that the material cannot be placed in layers of the thickness prescribed, such material shall be placed in the embankment in layers having a thickness of the approximate average size of the larger rocks but not to exceed 24 inches. Rocks or boulders too large to permit placing in a 24 inch layer shall be reduced in size as necessary to permit placement. Rock shall not be dumped in place but shall be distributed by blading or dozing in a manner to insure proper placement in final position in the embankment. Voids shall be filled with smaller stones, earth, sand, or gravel. Each layer shall be thoroughly consolidated before the next layer is placed.

Rock embankment shall be capped with 3 feet of soil material on all sides. The soil cap material shall not contain material having a maximum dimension greater than 3 inches.

- F. Compacting the Embankment: Before placing any embankment, the surface of the existing ground shall be prepared as specified herein, moistened as required, and the top 6 inches compacted to a density of 90 percent as prescribed by the following paragraph:

All embankment shall be compacted to a density of at least 90 percent of the maximum density for the material used as determined by ASTM D 698 with a moisture range sufficient to allow for proper compaction. In addition to the above required compaction, the subgrade between lines 1 foot outside of the curbs and within the top 6 inches of the subgrade in cut sections and the top 18 inches in fill sections shall be compacted to a density of at least 95 percent of the maximum density for material used as determined by ASTM D 698 and with a tolerance of $\pm 3\%$ of the optimum moisture at maximum density.

All work involved in either adding moisture to or removing moisture from embankment materials to within these moisture limits shall be considered incidental to the completion of the grading operation.

- G. Moisture – Density Determination: In-place density and moisture content of the embankment will be determined by an acceptable method as approved by the Engineer.

H. Testing

1. Laboratory compaction test and index property test results for each material used on site shall be submitted to the Engineer prior to placement. Any work by Contractor prior to test submittals and subsequent Engineer review and approval shall be work done at the Contractor's risk.
2. In-Place Density/Moisture tests shall be taken at the frequency of 4 per day per spread, with a minimum of one test per lift.
3. Test reports shall be submitted to the Engineer daily. The reports shall clearly indicate the location of all tests by street name, station and/or lot number, type of material, and elevation of test. The reports shall include the results of all tests (pass or fail) and all re-tests.
4. All test reports shall be submitted prior to receiving approval of subgrade for subsequent work. Pavement, curb, other surface features or utilities placed prior to receiving embankment approval shall be placed at the Contractor's risk.

- I. Backfilling Curb and Gutter: Backfilling behind curb or curb and gutter shall be done within seven (7) days after being laid unless otherwise approved by the Engineer. The material used to fill the void behind curb or curb and gutter shall be free of rock and debris and shall be of a type that will leave no voids to pocket water. Unless otherwise shown on the contract drawings, the finish grading from the back of the curb to the right-of-way line and/or utility easement line or construction easement line shall be performed to provide a smooth transition between existing yard grades at the right-of-way line and/or easement line to the curb so that positive drainage will exist.

The top portion of the backfill within right-of-way areas shall be finished with at least 6 inches of topsoil corresponding to, or better than, that underlying adjoining sodded areas. Topsoil shall be approved by the Engineer prior to placement, and unless otherwise directed, shall be material previously excavated and stockpiled for the purpose during excavating and grading operations. Immediately prior to dumping and spreading topsoil, the surface shall be loosened by discing or scarifying to a minimum depth of two (2) inches to permit bonding of the topsoil to the underlying surface.

2102.7 Finishing

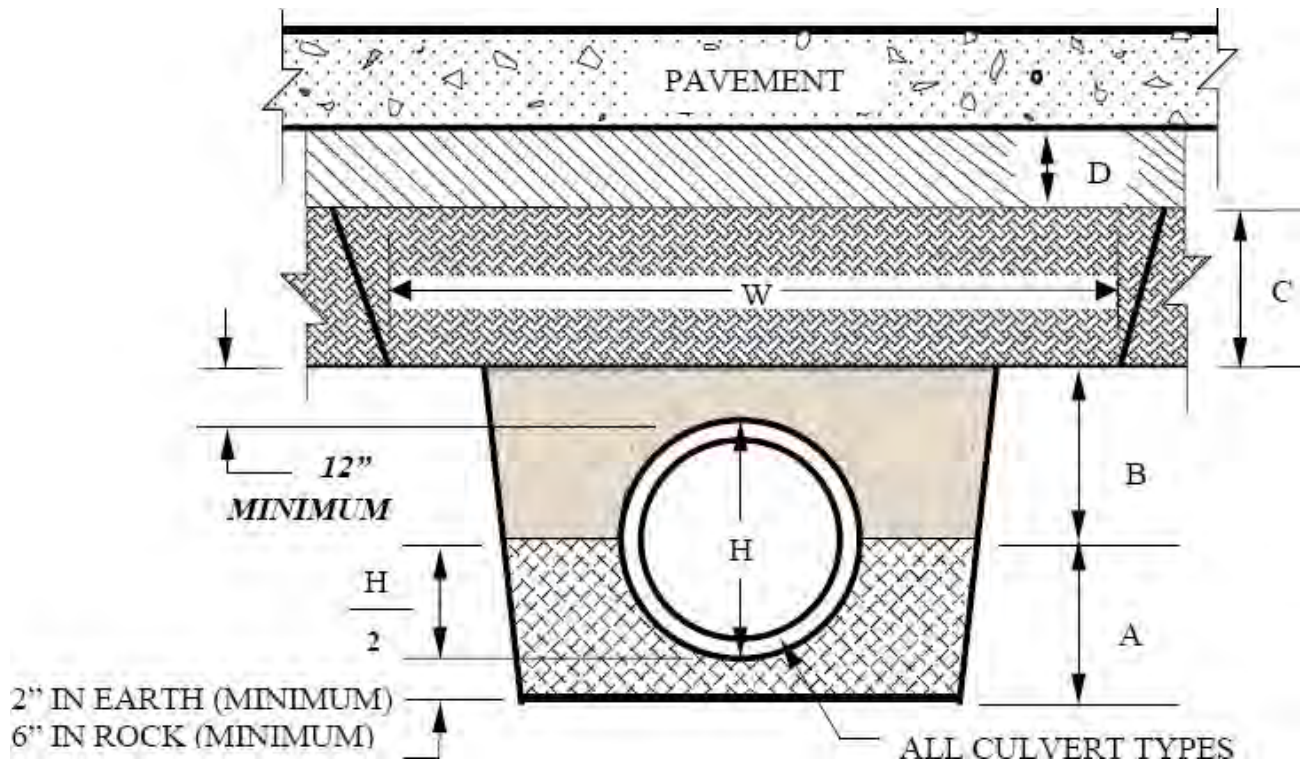
- A. In areas where sodding or seeding is proposed, the upper 12 inches of the surface area shall be earth material free of rocks greater than 1 inch in diameter. The top 6 inches shall be topsoil suitable for sustaining grass or sod.
- B. Except where other permit or utility work is in progress, the graded surface shall be made free of rock, concrete, and brick, or fragments thereof, or rubbish and shall be finished to the lines, grades, and cross-section indicated on the Plans, including shoulder, berm and sidewalk spaces.
- C. The Contractor shall repair any damaged surface, and shall not use any finishing equipment that will leave a marred surface. When the subgrade preparation is included as a part of the finishing, the work shall be accomplished according to the requirements of Section 2201 entitled "Subgrade Preparation", and shall be considered incidental to finishing the grading work.

2102.8 Cleanup

Cleanup shall follow the work progressively and final clean-up shall follow immediately behind the finishing. The Contractor shall remove from the site of the work all equipment, tools and discarded materials, and other construction items. The entire right-of-way or easement shall be left in a finished and neat condition. Cleanup shall be considered as incidental to the completion of grading work.

SECTION 2103 BACKFILL DETAILS

2102.1 Figure 1 - Deep Sewer Lines Using Earth Compaction Equipment, or in Depths Exceeding 30" of Cover)



A- Consolidated granular bedding material.

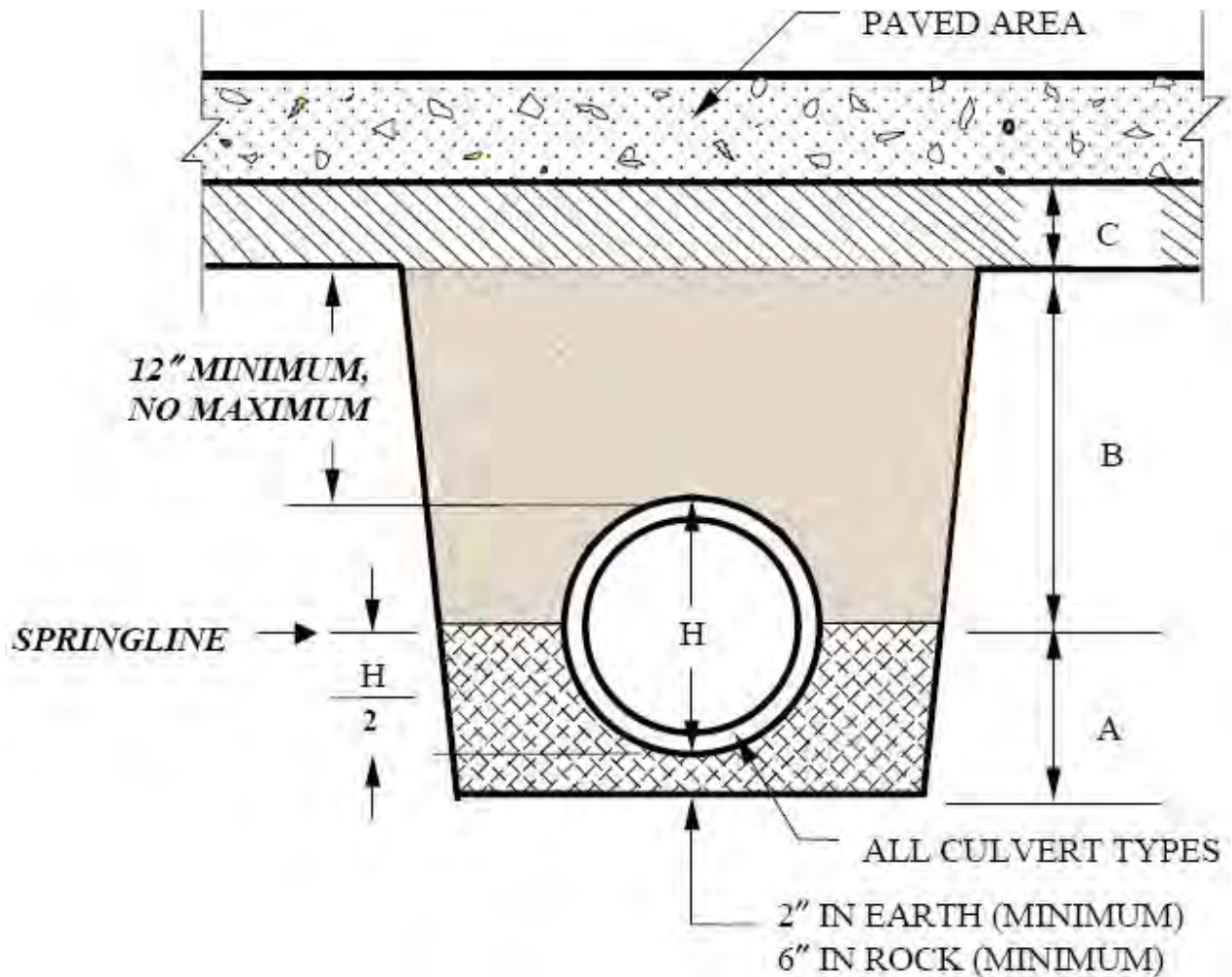
B- Granular bedding material or Flowable Backfill (CLSM).

C – Compacted Embankment - 2102.6. Lift thickness shall not exceed the capability of the equipment being utilized to achieve the proper density and consolidation, and in no case shall a lift exceed twelve inches for soil. The minimum width, W, shall be two feet wider than the width of the required compaction device, or five feet, whichever is greater.

D – Compacted Subgrade - Subgrade thickness shall be as specified in Table 1 of Section 5206 and as directed by the Engineer. Subgrade preparation shall be done in accordance with Section 2201 and shall consist of aggregate for base course, stabilized subgrade, or compacted soil – in accordance with the associated Sections 2201, 2202, and 2203.

2102.2 Figure 2 - Deep Trenches Without Roadway Compaction Equipment, or Shallow Trenches Having Less than 30" of Cover

The following cross-sectional view of typical storm sewer trench construction under street, alley pavements, and entrances Figure 2, shall apply to all storm sewer backfill areas where deep trenches are not widened to allow heavy roadway compaction equipment. Figure 2 shall also apply to shallow (30" to 18" from top of pipe to bottom of pavement) roadway trenches:



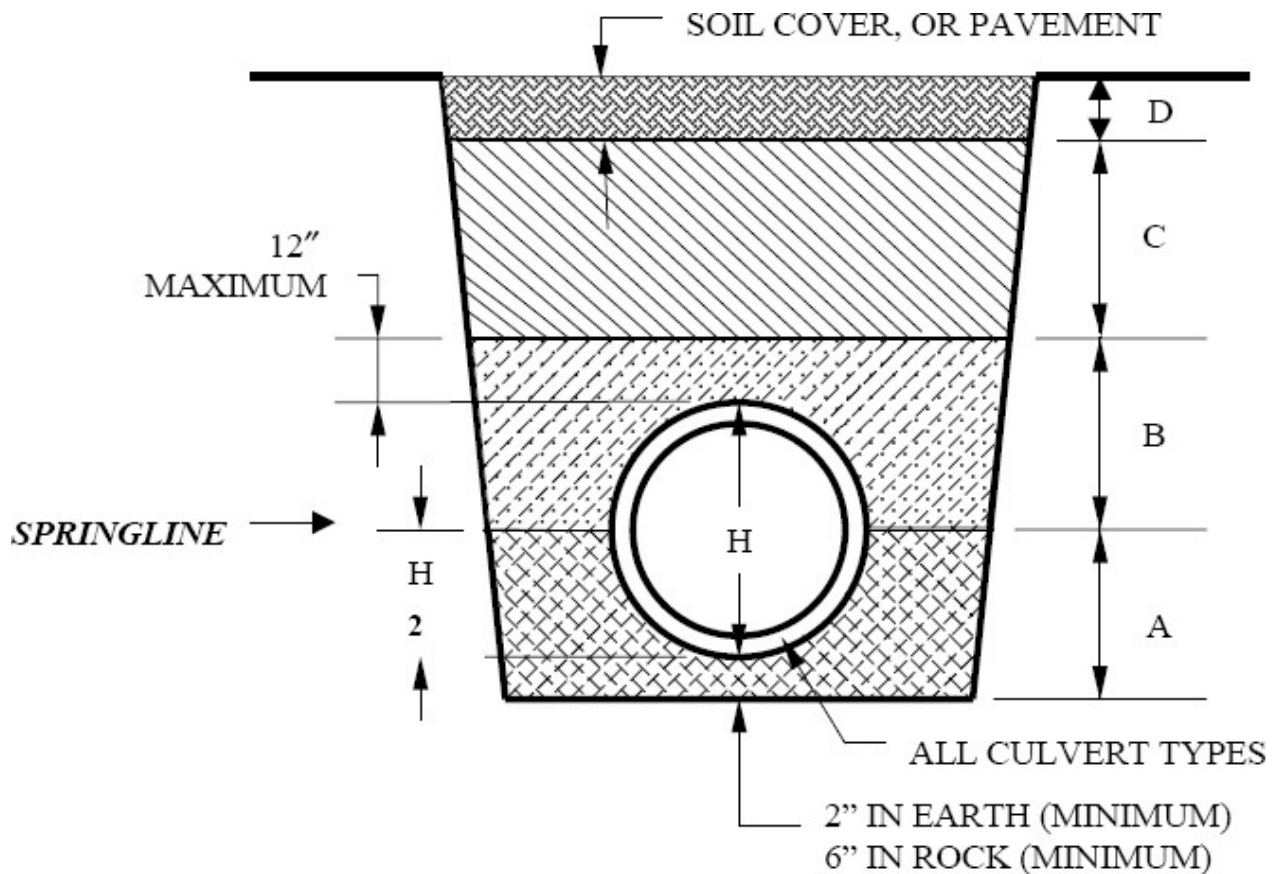
A- Consolidated granular bedding material.

B- Granular bedding material, hand compacted soil - 95% of max. density using ASTM D 698, or Flowable Backfill (CLSM). Maximum lift thickness 6". Granular bedding material shall be used in Zone B for all pipe except reinforced concrete pipe.

C – Compacted Subgrade - Subgrade thickness shall be as specified in Table 1 of Section 5206 and as directed by the Engineer. Subgrade preparation shall be done in accordance with Section 2201 and shall consist of aggregate for base course, stabilized subgrade, or compacted soil – in accordance with the associated Sections 2201, 2202, and 2203.

2102.3 Figure 3 - Trenches Outside of Street Pavements

Trench backfilling in areas other than street and alley pavements where the near edge of trench is behind the back of curb:



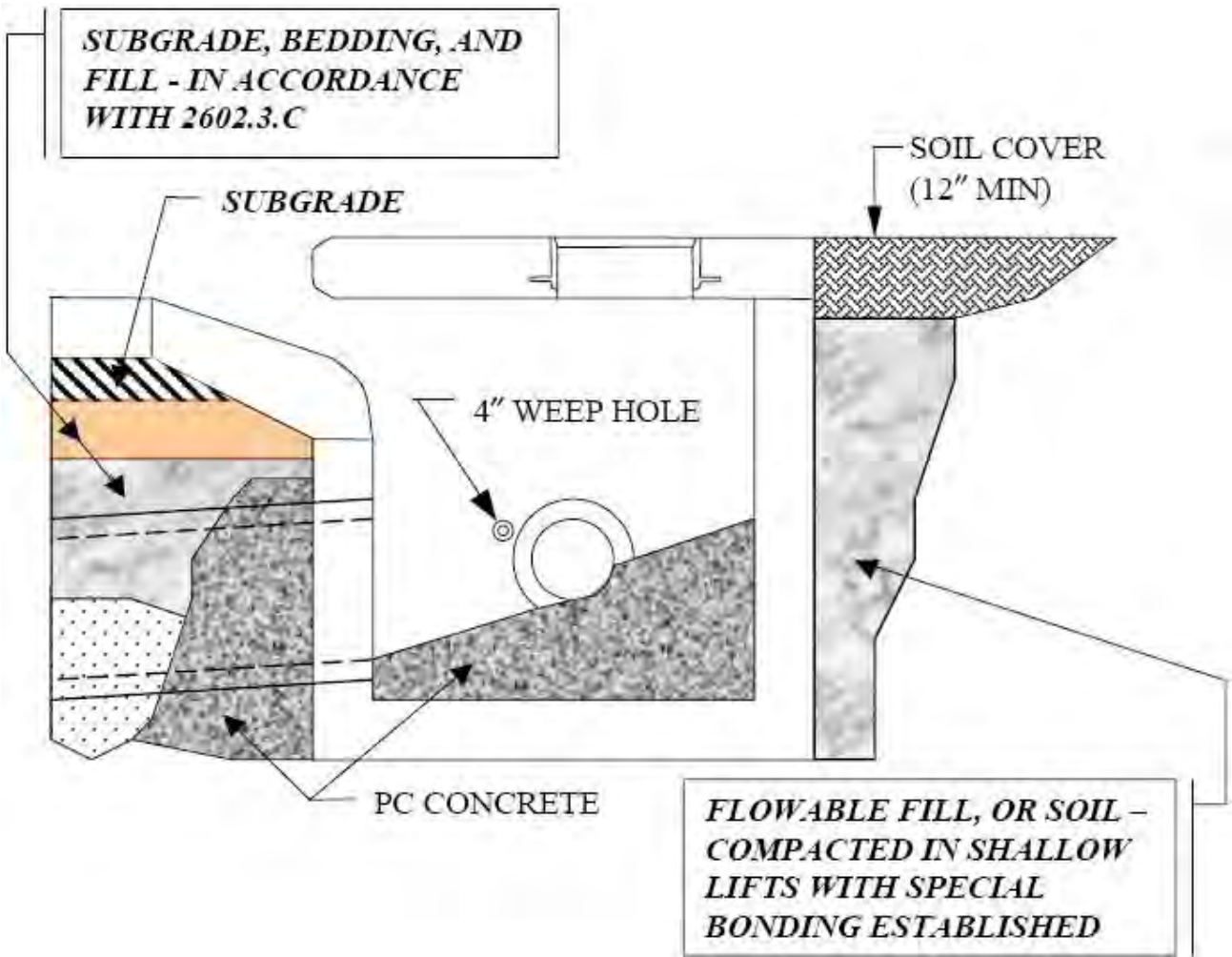
A – Consolidated granular bedding material.

B – Consolidated granular bedding material, flowable backfill (CLSM), or compacted soil – compacted to 90% of maximum density using ASTM D 698. Maximum lift thickness for the granular or soil materials shall be six inches.

C – Consolidated granular bedding material, flowable backfill (CLSM), or compacted soil – compact to approximate density of adjacent soil but not less than 90% of maximum density using ASTM D 698. Lift thickness shall not exceed the capability of the equipment being utilized to achieve the proper density and consolidation; however, in no case shall it exceed six inches for soil.

D – Soil Cover – Soil cover shall be as specified in Section 2102.7. The top twelve inches shall be consolidated soil; the top six inches shall be topsoil suitable for sustaining grass.

2102.4 Figure 4 – Structures Adjacent to Street Pavements



Note: Weep hole shall be backed by filter fabric or hardware cloth, and 3 cubic feet of granular material.

END OF SECTION

TECHNICAL PROVISIONS

Section 2150

Erosion and Sediment Control



Unified Government of Wyandotte County

January 2022

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SECTION 2151 GENERAL REQUIREMENTS

2151.1 Summary

This section describes general requirements to prevent or minimize the pollution of rivers, streams, lakes, and wetlands caused by runoff from the construction zone. Such pollution includes sediment that may migrate offsite through the action of wind, water, or traffic, as well as chemical spills or other refuse from the site.

This Section is not all inclusive for erosion and sediment control issues. For topics not specifically addressed in this Section, the Kansas City, Kansas and Wyandotte County Erosion Prevention and Sediment Control Field Guide shall be used as references.

2151.2 Contractor's Responsibility

The Contractor shall take measures to prevent or minimize the transport of sediment or pollutants from the project limits or into bodies of water that are intended for protection, in accordance with the plans, the requirements of applicable permits and regulations, and best available management practices.

2151.3 Compliance with NPDES Permits

The Owner will obtain a National Pollutant Discharge Elimination System (NPDES) permit and other similar local water pollution control permits as required. Where such permits are required, the Owner will provide the Contractor with a Stormwater Pollution Prevention Plan (SWPPP) which has been prepared by the Engineer or other qualified professional. The Contractor shall comply with all requirements of such permits and the SWPPP, and shall enforce compliance with such requirements by all Subcontractors. The Contractor shall complete the required certification forms for coverage under the relevant permit and shall notify all Subcontractors in writing of the requirements of the SWPPP, obligate them under contract to comply, and enforce compliance during the work.

2151.4 Projects Not Requiring a Permit

If neither NPDES permit nor other local water pollution control permits are required for a project, the Engineer may waive certain documentation and record-keeping provisions of this specification. The Contractor is required to comply with all other provisions in this specification and is required to install such measures for erosion and pollution control as may be called for in the plan or ordered by the Engineer.

2151.5 Stormwater Pollution Prevention Plan (SWPPP)

The Stormwater Pollution Prevention Plan (SWPPP) outlines methods and controls to be used to prevent stormwater pollution from the construction activities.

The SWPPP will generally consist of the following elements: (a) a site description; (b) a site map or plan sheets showing areas of soil disturbance, an outline of areas which will not be disturbed, and a drainage area map; (c) plan sheets, tables, or other schedules detailing the location of major structural and non-structural controls and areas where stabilization practices are expected to occur; (d) a description of erosion and sediment controls to be used; (e) a description of any permanent stormwater management features which are incorporated into the project; (f) a description of other controls related to waste disposal practices; (g) a description of the timing, during the construction, of when the measures will be implemented and removed; and (h) a description of maintenance procedures for control measures identified in the plan.

Where multiple agencies have jurisdiction over erosion and sediment control, the SWPPP will be prepared to satisfy the requirements of each. The use of the term "Stormwater Pollution Prevention Plan" or "SWPPP" is not intended to

limit its content to the provisions of any single permit program or jurisdiction, and this specification shall have the same meaning regardless of whether the applicable plans are referred to as a "SWPPP," "erosion control plan," "erosion and sediment control plan," "temporary water pollution control plan," or other equivalent term.

All elements of the project bid documents relating to erosion and pollution control are considered part of the SWPPP, either by direct inclusion or by reference, including plan sheets, specifications, special provisions, quantity tabulations, bid sheets, and contract documents. A copy of all NPDES and other water pollution related permits and permit applications are also part of the SWPPP. This specification is an integral part of the SWPPP.

2151.6 Contractor Amendments to the SWPPP

Prior to beginning work, the Contractor shall review the SWPPP in detail and provide the Engineer with written recommendations for amendments to improve the effectiveness of the SWPPP or to bring it into better alignment with the Contractor's intended method of operations. The Contractor shall also advise the Engineer of any omissions or deficiencies they find in the SWPPP. During the progress of the job, the Contractor shall continue to monitor the effectiveness and performance of the control measures used and propose additional amendments as needed. No amendment shall be incorporated unless approved by the Engineer, and a log of such amendments shall be made by the Contractor. When required by the permit or state law, such amendments shall be developed and prepared under the supervision of a qualified professional as defined in said permit or law. A copy of the SWPPP and all amendments shall be retained by the Contractor onsite and ready for inspection without notice.

2151.7 Contractor Schedule

In addition, the Contractor shall also provide the Engineer with a detailed schedule of their work prior to beginning, which shall include information on the expected timing, duration, and sequencing of erosion and sediment control measures and overall job completion and phasing. Once approved, such schedule shall become a part of the SWPPP, and changes to the schedule shall require amendment to the SWPPP.

2151.8 Alternate Methods or Materials

The Contractor may propose alternative methods or materials for any of the specific erosion and sediment controls given in the SWPPP, provided that such methods provide equal or improved measures of control, as determined by the Engineer. The Contractor shall submit any documentation required by the Engineer to evaluate the alternative. If agreed to by the Engineer (and subject to state or other permitting approval if applicable), payment for such alternate method shall be handled in accordance with the applicable provisions of the Contract for changes in work.

2151.9 Superintendent Training Required

The Contractor's resident superintendent shall have no less than 8 hours of formal training on erosion and sediment control within the last 24 months. Such training shall include the principles of erosion and sediment control, technical information on typical and/or innovative controls, and the contents of these specifications and related Standard Drawings and Design Criteria. The training shall be taught primarily by a registered professional engineer or other professional who is considered by the applicable regulatory agencies to be qualified to prepare a SWPPP. Documentation of training shall be submitted to the Engineer upon request, prior to beginning work.

2151.10 Duration of Contractor's Responsibility

The Contractor is responsible for water pollution control and permit compliance from the issuance of Notice to Proceed until final completion of the work and during any subsequent maintenance bond period. The notice of termination will not be submitted by the Owner until all permit requirements are met, which includes the requirement that final stabilization be achieved on 100% of the site. Vegetation shall achieve a density of at least

70% of full turf to be considered acceptable as final stabilization.

2151.11 Installation of Controls

The Contractor shall obey all requirements for chemical and waste controls specified in Section 2152. Contractor shall provide all specific erosion and sediment controls required by the SWPPP in accordance with the requirements of Section 2153 and 2154. If the SWPPP calls out items or controls not included in this specification, refer to the project special provisions and plans for requirements. Controls shall be installed prior to disturbance in an area, unless otherwise indicated in the plans.

2151.12 Maintenance

The Contractor shall maintain the integrity of the temporary erosion and sediment control devices as long as they are in required and in place. Devices not functioning properly shall be corrected or replaced. Accumulated sediments shall be removed promptly as detailed in Section 2154.

2151.13 Removal

Control measures shall be completely removed from the site when they are no longer needed, unless they are approved by the Engineer to remain in place for permanent stabilization or biodegradation (i.e. erosion control blankets).

2151.14 Inspections

The Contractor shall inspect the construction site within twenty-four hours of the end of a storm which results in precipitation of 0.5 inches or greater, during both active and inactive phases. In addition, regular inspections shall be made weekly during active phases of construction. During inactive phases (such as winter when construction activity has temporarily ceased), an inspection of the site condition shall be made no less than once every 14 days. All installed practices shall be checked for proper installation, operation, and maintenance. Locations where stormwater runoff leaves the site shall be inspected for evidence of erosion or sediment deposition. Deficiencies shall be noted in a report of the inspection and corrected within seven calendar days of the inspection.

A report of each inspection is to be made within 24 hours of the inspection and shall contain the following minimum information: inspector's name, date of inspection, observations relative to the effectiveness of the practices, actions taken or necessary to correct deficiencies, a listing of areas where construction operations have permanently or temporarily stopped, observations at stormwater discharge locations, and any other item required of an inspection by the applicable permits. The inspection report shall be signed by the person performing the inspection. Site inspection reports shall be maintained onsite with the SWPPP or the SWPPP shall contain written documentation of the off-site records storage location.

2151.15 Records

The Contractor shall maintain all permit required records during the job and shall transmit all necessary records to the Engineer at the completion of the work, including all Contractor and Subcontractor certifications and site inspection records, as well as other records requested by the Engineer.

2151.16 Site Access for Inspections

The Contractor shall allow authorized representatives of federal, state, or local agencies having jurisdiction of this permit, upon presentation of proper credentials, to enter the site where construction activities are located, to obtain samples of any discharge water, to have access to and copy at reasonable times, any records which shall be kept,

and to inspect any facilities or equipment.

2151.17 Maximum Areas of Disturbance at One Time

The surface area of erodible earth material exposed by site operations shall be limited by the Engineer according to the Contractor's capability and progress in keeping with the approved schedule. Existing vegetation shall be preserved or retained as long as practical and the time period for soil areas to be without permanent surface or vegetative cover shall be minimized. The maximum surface area of erodible earth exposed at one time shall not exceed ten (10) acres unless approved in writing by the Engineer or otherwise provided for in the plans. The Contractor shall pay close attention to the grading and disturbance limits indicated on the plan or authorized by the Engineer.

2151.18 Measures Where Construction has Ceased

Soil stabilizing erosion control measures as detailed in Sections 2153 shall be implemented within 14 calendar days after construction activities have temporarily or permanently ceased on any portion of the site. Exceptions to this requirement are as follows: (a) if implementation of erosion controls is precluded by snow cover, such measures shall be taken as soon as practical after snowmelt, or (b) a waiver to this requirement is justified and approved by the Engineer in writing, in which case a specific deadline for installing erosion controls shall be established.

2151.19 Duration Limits for Select Activities

For certain items of work, the plans or standard sequences may contain specific time limits for the maximum duration of exposure, typically stated as "Item A construction shall have a maximum exposure time of X days." Where such limits are specified, the time shall be measured from the date in which stabilized ground cover is first disturbed in the work area until the specified construction is complete and permanent or temporary stabilization shown on the Plans is applied. Contractor shall be responsible for documenting the elapsed time on all such work, typically by noting the time in their inspection logs, taking time-stamped photographs, and/or by marking the area with a wooden stake documenting beginning and ending dates. The Engineer may grant extensions of time requested by the Contractor when justified and suitable interim stabilization measures are provided.

2151.20 Construction near Rivers, Streams, and Waterbodies

Construction operations in or near rivers, streams, and other water impoundments shall be restricted to those areas essential for construction. Unless otherwise provided for in the plans, a minimum 50 feet buffer of undisturbed vegetation shall be maintained between construction operations and defined drainage courses. Where such buffers are not provided, work shall not be initiated until all materials and equipment necessary to complete the work are on site and such operations shall be completed as quickly as possible once the work has begun. When no longer required, all falsework, pilings, temporary crossings, and other obstructions shall be promptly removed. Stream crossings shall be limited to those detailed in the plans or as approved by the Engineer.

2151.21 Culverts, Ditches and Storm Sewers

Construction of major elements of the proposed storm sewer or other drainage systems shall be coordinated to minimize the duration of time over which stormwater would run through temporary, erodible channels. Unless otherwise indicated on the plans, construction of the major elements of this system shall be among the first activities on the project. Once begun, construction shall proceed expeditiously to completion, including placement of all final headwalls, end structures, rip-rap and other end treatments. Temporary or permanent ditches which are graded on the project shall either be stabilized or have temporary sediment controls installed within seven (7) days of their grading.

SECTION 2152 CHEMICAL AND WASTE CONTROLS

2151.1 Summary

This section describes specific requirements to control non-sediment related pollutant discharges from chemicals and wastes from the site, including requirements for chemical handling, spill prevention, spill response, and waste disposal.

2152.2 Solid, Liquid, and Hazardous Wastes

All trash shall be placed in dumpsters or trash barrels provided by the Contractor and accumulated trash shall be hauled offsite and properly disposed. Floating debris found in any waterbody on or immediately adjacent to construction shall be removed immediately, regardless of source. Hazardous wastes shall be stored, transported offsite, and disposed of properly.

2152.3 Sanitary Wastes

Sanitary facilities shall be made available and their use enforced by the Contractor.

2152.4 Leak Prevention

All equipment used onsite shall be free of leaks, receive regular preventative maintenance, and be inspected daily to reduce chance of leakage. No fueling, servicing, maintenance, or repair of equipment shall be done within 50 feet of a stream, drainage way, lake, storm sewer manhole or other water body. Onsite fuel tanks shall be in good condition, free of leaks or drips, painted brightly for visibility, and monitored daily. All fuel tanks, including mobile trailers, shall be protected by a secondary containment system or earthen berm sized to contain 110% of the full tank volume.

2152.5 Concrete Washout

Concrete wash or rinse water from concrete mixing equipment, tools and/or ready-mix trucks, tools, etc., shall not be discharged into or be allowed to run directly into any existing water body or storm inlet. One or more locations for concrete wash out shall be designated on site and installed in accordance with the Standard Drawings.

2152.6 Chemical Handling and Storage

Chemicals or materials capable of causing pollution shall only be stored onsite in their original container. Materials stored outside shall be in closed and sealed water-proof containers and located outside of drainage ways or areas subject to flooding. Manufacturer's data regarding proper use and storage, potential impacts to the environment if released, spill response, and federally-defined reportable quantities for spill reporting shall be maintained by the field superintendent onsite at all times. Locks and other means to prevent or reduce vandalism shall be used.

2152.7 Herbicides, Pesticides and Fertilizers

Herbicides, pesticides and fertilizers used as part of the work shall be applied only in accordance with manufacturer recommendations. Direct spray into water bodies is prohibited. Such chemicals shall not be used if rain is forecast within 24 hours, unless they are approved for wet weather application.

2152.8 Spill Clean-up and Management

If it is safe to do so, Contractor shall stop the source of any spills or leaks and shall contain spills immediately with an appropriate device, earthen berm, sawdust, sand, kitty litter, rags or other absorbents. Manufacturer recommendations

shall be followed. Leaks from broken hoses shall be immediately contained with hose clamps, plugs, or drained into leak-proof containers. Contractor shall have the tools, equipment, and supplies necessary for spill response onsite at all times and ready for immediate use. Contractor personnel shall be trained to properly respond immediately to a leak or spill. All spills shall be cleaned up and disposed of in accordance with applicable federal, state, and local regulations. Local hazardous materials response units shall be called if assistance is needed in stopping or containing the spill.

2152.9 Spill Reporting

All spills in excess of reportable quantities shall be reported to the appropriate federal, state, and local agencies within 24 hours of their occurrence. The Contractor shall maintain a listing of all such agencies onsite within the SWPPP and in easy reference for onsite personnel. Spills that pose an immediate threat to public safety or contamination of a water body shall be reported immediately to designated first response authorities. A current listing of applicable phone numbers for the jurisdiction shall be placed at the front of the SWPPP and posted conspicuously on the jobsite.

SECTION 2153 EROSION CONTROLS

2151.1 Referenced Standards

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

APWA, Kansas City Metropolitan Chapter (KC-APWA):
Standard Drawings, Division III of Standard Specifications and Design Criteria

Erosion Control Technology Council (ECTC):
Standard Specification for Rolled Erosion Control Products (RECPs).

Kansas Department of Transportation (KDOT):
Standard Specifications for State Road & Bridge Construction, 2015 Edition or later including all latest errata and adopted Special Provisions, as well as associated Standard Drawings.

Texas Department of Transportation (TxDOT):
Approved Products List (APL) for Erosion Control. Based on testing and standards cited in the report "TxDOT / TTI Hydraulics, Sedimentation and Erosion Control Laboratory: Field Performance Testing of Selected Erosion Control Products".

US Composting Council (USCC):
STA – Seal of Testing Assurance Program; and TMECC - Test Methods for the Examination of Composting and Compost. Information available online at www.compostingcouncil.org.

2153.2 Summary

This section describes specific requirements for installation and maintenance of temporary measures to stabilize onsite soils and prevent erosion during construction.

2153.3 Materials

Materials used for erosion controls shall meet the requirements of the following subsections. Unless otherwise specified herein, the Contractor shall submit, for each material used, a certification prepared by the manufacturer which states that the materials meet all the requirements of this specification. The manufacturer shall also provide supporting documentation and testing results to validate this certification, if requested by the Engineer. Manufacturer's instructions for installation of materials (when applicable) shall be available onsite whenever work is occurring and a copy shall be submitted to the Engineer upon request.

2153.4 Permanent Seeding and Sodding

Final stabilization with vegetation by either permanent seeding or sodding is the most effective form of erosion control and shall be achieved as early in the construction process as possible.

- A. Materials, Construction Requirements and Maintenance: Permanent seeding or sodding shall be provided as specified in Section 2400 of these Standard Specifications.
Contractor shall schedule work so that permanent seeding is conducted as early as practical in the construction process. Multiple mobilizations of seeding or sodding operations shall be expected.
- B. Out-of-Season Special Provision: The Engineer may request that permanent seeding be conducted

anytime between April 16 and August 14 and/or that sodding be conducted anytime between June 1 and September 1, even though such dates are outside the standard seasons established in Section 2400. If agreed to by the Contractor, then the Contractor shall conduct such seeding or sodding and shall be responsible for the establishment of a vigorous and healthy seed or sod cover. The Contractor will be paid, however, for all watering necessary during the period that falls outside the standard season.

2153.5 Temporary Seeding

Interim stabilization with annual vegetation to provide temporary cover to minimize erosion. This item only covers seeding installed by conventional drilling.

- A. Materials: Seed and equipment used for temporary seeding shall meet all the criteria given for permanent seeding in Section 2400 of these Standard Specifications. Fertilizer is not required.

Mulch used for temporary seeding shall meet the same requirements as "mulch cover" in subsection 2153.6. Mulch is required unless erosion control blankets are being used instead.

The following seed mixtures and planting rates shall be used:

1. Type "TR" Seed: This mixture will normally be used when temporary seeding is conducted between February 15 and May 31, or between September 1 and October 31. The seed mixture will be as follows:

Kind of Seed	Minimum Pure Live Seed (%)	Rate of Pure Live Seed (lbs per Acre)
Annual Rye Grass	83	90

2. Type "TM" Seed: This mixture will normally be used when temporary seeding requires heat tolerance, typically for planting anytime between May 1 and August 15. (Volunteer millet is aesthetically objectionable in turf grass lawns; therefore, some jurisdictions may restrict use of this mix. Confirm local requirements before use.) The seed mixture will be as follows:

Kind of Seed	Minimum Pure Live Seed (%)	Rate of Pure Live Seed (Lbs per Acre)
Millet	77	65

3. Type "TW" Seed: This mixture will normally be used when temporary seeding requires cold tolerance, typically for planting anytime between September 15 and November 30. The seed mixture will be as follows:

Kind of Seed	Minimum Pure Live Seed (%)	Rate of Pure Live Seed (Lbs per Acre)
Winter Wheat	83	120

- B. Construction Requirements: Preparation, planting and all other construction requirements for temporary seeding shall be as specified for permanent seeding in Section 2400, except as modified herein. Temporary seeding shall be drilled (see 2153.8 for hydraulic application of temporary seed). Prior to application, the soil shall be tilled to a depth of at least 2 inches and gullies, depressions, and large clods eliminated. Roller

compaction of the seedbed is not required. Within 24 hours of seeding, mulch or erosion control blankets shall be applied. When mulch is used, it shall be applied in accordance with the same requirements given for "Mulch Cover" in subsection 2153.6. When erosion control blankets are used, they shall be installed in accordance with the requirements in subsection 2153.9. The Contractor shall initially water all areas of temporary seeding at least one-quarter inch as soon as the mulch is laid. Additional watering may be necessary for plant germination and adequate growth to provide cover. Contractor shall schedule work so as to provide temporary seeding as early as practical in the construction process. Contractor shall maintain a readiness to perform temporary seeding frequently during the progress of the project. No more than 7 calendar days shall elapse between the Engineer's request for temporary seeding and its application. Multiple mobilizations to seed areas as construction progresses shall be expected.

- C. Maintenance: Mulch shall be replaced or repaired as needed during germination and early growth. Bare spots shall be patched, by hand seeding if necessary. Vehicle and personnel traffic shall be minimized in areas seeded.

2153.6 Mulch Cover

Mulch applied without seeding to protect the soil surface from raindrop impact and reduce wind erosion and dust. Mulch Cover (without seed) is generally used when ground cover is required and temporary or permanent seeding is not feasible.

- A. Materials: Mulch shall be vegetative type only, consisting of cereal straw from stalks of oats, rye, wheat or barley and shall be free of prohibited and noxious weed seeds.
- B. Construction: Prior to applying mulch, the soil shall be tilled to a depth of 2 inches to eliminate hard crust and allow rainwater intercepted by mulch to infiltrate the soil. Gullies, depressions, and large clods shall be eliminated.

Mulch shall be applied at the rate of 1.5 tons/acre (3,000 lbs/acre) and be anchored into the soil a minimum depth of 3 inches by use of a heavy disc harrow, set nearly straight, or a similar approved tool. Discs of the anchoring tool shall be set approximately 9 inches apart. Anchoring shall be accomplished by not more than two passes of the tool. If approved by the Engineer, a tackifier may be applied to the mulch to anchor it instead of using the disc harrow.

- C. Maintenance: Mulch cover shall be replaced or repaired as needed. Bare spots shall be filled in, by hand if necessary. Vehicle and personnel traffic shall be minimized in areas mulched.

2153.7 Hydrocover (Standard)

Hydraulic application of a standardized mixture of fiber mulch, tackifier, and temporary seed to provide temporary cover.

- A. Materials:
 - 1. Fiber Mulch: Fiber mulch shall be a manufactured, pre-packaged, biodegradable material. The material supplied shall meet the requirements of ECTC's Standard Specification for Hydraulic Erosion Control Products (HECPs) (version 2.4 dated April 2, 2014) for Type 3 products, having a functional longevity of 3 months, a maximum uninterrupted slope length of 50 feet, and applied to a slope that is flatter than 3:1. In addition, the material shall also be listed on the TxDOT Approved Products List for Erosion Control under the category "Mulches 4:1 or Flatter Slopes" and specified for use on "Clay or Tighter Soils".

2. Tackifier: Shall be food-grade hydrolyzed guar gum powder or alternate material as specified by the manufacturer. It shall be mixed with the cellulose fibers based on the manufacturer's recommendations.
 3. Water: Shall be clean, potable water mixed at a rate suitable for the equipment being used and as recommended by the manufacturer.
 4. Seed: Shall be Type TR, TM or TW seed as specified in Section 2153.5 and appropriate for the season. Seed shall be mixed to provide no less than the seeding rate per acre given in that section.
 5. Fertilizer: Not required unless specified by the Engineer
- B. Construction Requirements: The fiber mulch shall be added to the hydraulic seeder along with proportionate amounts of seed, tackifier, and water in accordance with the manufacturer's recommendation. It shall be applied to make a uniform coverage of the soil surface. Prior to application, the soil shall be tilled to a depth of at least 2 inches and smoothed to eliminate gullies, depressions, or large clods. The Standard Mix Hydrocover mix shall not be used on any slope steeper than 4:1. Contact the engineer for alternate specifications to be used on steeper slopes if there is a discrepancy.
- Hydrocover shall be applied at a minimum rate of 2,000 pounds dry weight of fiber per acre (0.41 pounds per square yard), unless otherwise specified by the manufacturer. Once applied, the area shall be allowed to dry and vehicle and personnel traffic shall be kept off the stabilized area. Water shall be applied as needed for seed germination and plant growth. The hydrocover operation shall be accomplished with hydraulic sprayers suitable for spreading and projecting the mixture and fitted with the appropriate nozzle tips. Sprayers shall be mechanically mixed or jet agitated.
- Contractor shall maintain a readiness to provide hydrocover frequently during the progress of the project. No more than 7 calendar days may elapse between the Engineer's request for hydrocover and its application. Multiple mobilizations of hydrocover operations shall be expected.
- C. Maintenance: Areas which are disturbed by construction shall be patched with additional application of slurry at the next available mobilization of equipment at no additional cost. Small areas of poor coverage may be stabilized through erosion control blankets, mulch for cover, straw wattle protection or other measures, at no additional cost.

2153.8 Hydrocover (Specialty Mix)

Hydraulic application of specialized mixtures of fiber mulch, tackifiers, seed and other additives to provide temporary cover. Such specialized mixtures may provide for steeper slopes, more robust protection, longer durability, or enhanced vegetative growth, as compared to the Standard Mix.

- A. Materials: When specialty mixtures are used, the particular mix design and ingredient requirements shall be given in the plans or special provisions. Such specialty mixtures may include additives for improved seed germination, mixtures of special polymer tackifiers and heavier rates of cellulose fiber or other cross-linking organic fibers to produce a more continuous cover (i.e. "Bonded Fiber Matrix"), or mixtures that contain polyacrylamides that chemically stabilize the underlying soils (i.e. "Stabilized Fiber Matrix"). Seed and additives shall conform to the requirements of standard hydrocover, except as modified in the plans, special provisions or by the manufacturer's recommendations for the specialty mix.

- B. Construction and Maintenance Requirements: All construction and maintenance requirements shall be the same as for standard hydrocover, except as modified by the plans or the manufacturer's recommendation for the specialty mix. Equipment for specialty mixes shall conform to manufacturer's recommendations.

2153.9 Erosion Control Blankets (including Turf Reinforcing Mats)

Blankets or mats of natural, synthetic, or composite materials that can be rolled onto bare earth and anchored in place to provide temporary or permanent cover and/or to stabilize bare earth or channels subject to overland or concentrated surface flow. This item of work includes the use of Turf Reinforcing Mats.

- A. Materials: Erosion control blankets of the class and type specified in the contract shall be a "Rolled Erosion Control Product" as defined by the ECTC Standard Specification. Further, the material shall be listed in the current TxDOT Approved Products List for Erosion Control. Blankets are categorized by expected use and application, as follows:

Class 1: For use as Cover and Slope Protection from overland flow: Type A: On slopes

1:3 or flatter with clay soils.

Type B: On slopes 1:3 or flatter with sandy soils. Type C: On

slopes steeper than 1:3 with clay soils. Type D: On slopes steeper than 1:3 with sandy soils.

Class 2: For use as Flexible Channel Liner under concentrated flow: Type E. For shear stresses below 2 lb/sq. ft.

Type F. For shear stresses below 4 lb/sq. ft. Type G. For

shear stresses below 6 lbs/sq. ft. Type H. For shear stresses below 8 lb/ sq. ft.

Materials supplied for Type A, B, C, D, E and F blankets shall have a minimum expected longevity of 12 months, unless otherwise stated on the plans or approved by the Engineer. Materials supplied for Type G and H shall have a longevity of greater than 5 years. Materials for Type H shall be 100% synthetic. Expected longevity shall be evaluated based on the manufacturer's data.

Construction Requirements: The Contractor shall install erosion control blankets in the locations shown in the plans and in accordance with the Standard Drawings and manufacturer's recommendations.

- B. Maintenance: Maintain blankets in accordance with the Standard Drawings and manufacturer's recommendations.

2153.10 Compost Cover

Organic compost applied with or without seeding to protect the soil surface from raindrop impact, absorb stormwater, facilitate vegetation growth and reduce wind erosion and dust.

- A. Materials: *(Note: The material requirements in this subsection do not apply for compost filter berms and compost filter socks, and are described more fully in Sections 2154.10 and 2154.11.)*

All compost shall be mature, sanitized, well-composted organic matter free of identifiable feedstock constituents and offensive odors. Compost shall have been produced by the aerobic decomposition of organic material. Organic material sources may include leaves and yard trimmings, paper fiber, wood, bark, biosolids, food scraps, composted manures, or combinations of these products. Biosolids compost shall

comply with the Standards for Class A biosolids outlined in 40 Code of Federal Regulations (CFR) Part 503. The compost shall be free of any refuse, contaminants, and any material toxic to plant growth. Compost must not be derived from mixed municipal solid waste. Compost shall comply with all applicable state and federal regulations regarding production and distribution.

All compost material supplied shall be certified through one of the following programs:

1. The USCC STA Program through a certified supplier, and wherein all testing procedures follow the USCC TMECC manual.
2. The KDOT Specification found at Section 2105 for Soil Compost Materials, wherein all testing procedures are in accordance with the requirement listed there.

Before delivering of the compost, the supplier shall provide a copy of the lab analysis and certifications as outlined for the applicable program. The supplier shall also document the feedstocks and sources used in the compost to be supplied.

- B. Construction: Prior to applying compost, the soil shall be tilled to a depth of 2 inches to eliminate hard crust and allow rainwater intercepted by the compost cover to infiltrate into the soil. Gullies, depressions, and large clods shall be eliminated.

Compost shall be applied to a depth of 1.5 to 2 inches when alone or 1 to 1.5 inches when used in conjunction with seeding operations. Compost shall be uniformly applied using an approved spreader unit, which may include mechanical or pneumatic (blower) devices. Compost shall extend at least 3 feet beyond the shoulder of any slope to ensure that runoff does not flow under the cover. Once applied, the compost shall be thoroughly watered to improve settling.

- C. Maintenance: Compost shall be replaced or repaired as needed. Bare spots shall be filled in, by hand if necessary. Vehicle and personnel traffic shall be minimized in areas covered.

2153.11 Surface Roughening

Any rough graded slope that is not yet ready for seeding or other treatment and which will not be disturbed by ongoing construction for a period of 7 days or more shall be roughened by grooving, tracking, disking, or ripping it with a disc, tiller, spring harrow or other suitable implement. Such grooves shall be located traverse to the slope face and shall not be less than 3 inches deep nor spaced more than 15 inches apart. The requirement to roughen slopes by tracking or grooving shall apply to all slopes steeper than 6:1 horizontal to vertical. No measurement or payment shall be made for this item, but it shall be subsidiary to the earthwork.

2153.12 Dust Control

Contractor shall take effective measures to prevent blowing dust. Adequate moisture content shall be maintained in all exposed soils by application of water or other approved dust suppressant. Areas to be subsequently paved may be treated with asphalt emulsion. When dust produced by operations such as sand blasting, concrete grinding, and sawing of concrete or masonry would create a public nuisance, they shall be performed under a water spray or an alternate construction method shall be used. No measurement or payment shall be made for this item, but it shall be subsidiary to other work.

SECTION 2154 SEDIMENT CONTROLS AND DIVERSIONS

2154.1 Referenced Standards

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

AASHTO:

M 288 - Geotextile Specification for Highway Applications

APWA, Kansas City Metropolitan Chapter (KC-APWA):

Standard Drawings, Division III of Standard Specifications and Design Criteria

ASTM:

D 3786 - Test Method for Hydraulic Bursting Strength of Textile Fabrics – Diaphragm Bursting Strength Tester Method

D 4355 - Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus

Kansas Department of Transportation (KDOT):

Standard Specifications for State Road & Bridge Construction, 2015 Edition or later including all latest errata and adopted Special Provisions, as well as associated Standard Drawings.

2154.2 Summary

This section describes specific requirements for installation and maintenance of temporary measures to detain, filter, or cause settlement of sediment from runoff, as well as measures used to temporarily direct or divert runoff onsite or at the site perimeter.

2154.3 Materials

Materials used for sediment controls and diversions shall meet the requirements of the following subsections. Unless otherwise specified herein, the Contractor shall submit a certification prepared by the manufacturer for each material used which states that the materials meet all the requirements of this specification. The manufacturer shall also provide supporting documentation and testing results to validate this certification, if requested by the Engineer. Manufacturer's instructions for installation of materials (when applicable) will be available onsite whenever work is occurring and a copy shall be submitted to the Engineer upon request.

2154.4 Sediment Removal and Disposal

Removal of accumulated, settled sediment from behind barriers, traps, or within basins.

- A. Materials: Not applicable.
- B. Construction Requirements: Accumulated sediment shall be removed when it exceeds the volumes specified for any particular measure or would otherwise impede the proper operation of control measures. Sediments removed shall be mixed with other onsite materials and incorporated into project fills, spread loosely across the site, or hauled offsite as necessary. Sediments shall not form an identifiable layer or seam in any fill. Sediments hauled offsite shall be dewatered first or hauled in a water tight truck. Sediments shall be located and compacted in a way which minimizes the likelihood of being resuspended in future rainfalls. Removal shall be by machine or hand work, whichever is most feasible.

C. Maintenance: Not applicable.

2154.5 Silt Fence

A temporary barrier of synthetic fabric embedded in the ground and supported by posts used to divert water or to maintain a trap for settlement.

A. Materials, Construction Requirements and Maintenance: Refer to the Standard Drawings.

2154.6 Straw Bales

Straw bales shall not be used.

2154.7 Rock Ditch Checks

Small temporary stone ditch checks used to form protect ditches with larger flows.

A. Materials: Rock shall be a clean aggregate free of deleterious substances, including earth, chert, cracks, seams, soapstone, shale or other easily disintegrated materials. Rock shall come from a primary run and be screened to remove the easily separated fines. It shall meet the gradation requirements below for the nominal size specified:

2-inch Rock: Fifty percent (50%) by weight of the particles shall be larger than 1.5 inches in diameter and none shall be larger than 4 inches. Total aggregate and fines smaller than ½ inch shall not exceed 2 % by weight.

4-inch Rock: Fifty percent (50%) by weight of the particles shall be larger than 4 inches in diameter and none shall be larger than 9 inches. Total aggregate and fines smaller than 1" shall not exceed 2 % by weight.

6-inch Rock: Fifty percent (50%) by weight of the particles shall be larger than 6 inches in diameter and none shall be larger than 12 inches. Total aggregate and fines smaller than 1" shall not exceed 2 % by weight.

The Engineer may approve modifications to these gradations to accommodate readily available stockpiles from local quarries.

B. Construction Requirements: See Standard Drawings.

C. Maintenance: See Standard Drawings.

2154.8 Synthetic Sediment Barriers

Any one of various proprietary ditch checks, primarily composed of synthetic materials, that can be used instead of the other measures specified herein to control velocities and erosion in ditches or swales.

A. Materials: Materials for any given Type of Synthetic Sediment Barrier shall be as called out in the plans or Standard Drawings. In addition, this category may also include those measures called out as "Synthetic Sediment Barrier" in KDOT Specification Sections 902 and 2114.

- B. Construction Requirements: Install Synthetic Sediment Barrier's in accordance with manufacturer instructions. Pay particular attention to anchoring, protection of channel underneath, and to conditions at the ends to avoid bypassing.
- C. Maintenance: Remove silt when it accumulates to 20% of the height of the barrier or when the accumulation prevents the proper operation of the ditch check, whichever is less. If units are damaged or dislodged during the sediment removal process, repair and re-establish continuity.

2154.9 Biodegradable Logs (or Wattles)

Circular tubes of netting filled with straw or other biodegradable fibers and used as a small height barrier for diversion of water or settlement.

- A. Materials: Biodegradable logs are manufactured using a variety of filler materials. For this specification, the following two classes of filler are specified:

Class A: Rice or wheat straw fibers Fiber material shall be certified as weed free in accordance with state standards. Fibers shall have an average length greater than 3 inches. Type A wattles shall have a durability in the field of no less than 3 months. Type A wattles shall be specified with dimensions and minimum weights of 9-inch diameter (1.7 lbs./lin ft.); 12-inch diameter (2.5 lbs/lin. ft.) or 20-inch diameter (3.5 lbs/lin. Ft.)

Class B: Excelsior wood fibers, coconut fiber (i.e. coir), jute, or other longer-lasting biodegradable materials. Such materials shall be free of deleterious substances, compacted tightly, and shown to have an in-field durability of 6-months or greater. Class B wattles shall be specified with dimensions 9-inch diameter, 12-inch diameter, or 20- inch diameter.

Containment netting shall be jute or light-weight plastic. The entire wattle unit shall be sufficiently durable to withstand weather, construction, and installation conditions for no less than the life of the filler material (see above), including multiple movements and reinstallations. Wood posts of sufficient strength withstand installation and weather shall be used for anchoring.

- B. Construction Requirements: Biodegradable logs shall be located as shown on the plans or directed by the Engineer. Individual units shall be installed in accordance with manufacturer's recommendations and the Standard Drawings.
- C. Maintenance: Maintain as called out in the Standard Drawings.

2154.10 Compost Filter Berm

A berm or dike of compost placed to trap pollutants and filter runoff from small areas of overland flow.

- A. Materials: Compost to be used in filter berms shall meet the following requirements:

<u>Parameter</u>	<u>Range</u>
pH	5.0-8.5
Moisture Content	<60%
Organic Matter Content	>25% of dry weight
Particle Size	99% < 2", 30%-50% < 3/8"

- B. Construction Requirements: Compost filter berms shall be constructed using specially designed pneumatic equipment (blowers) and a berm shaping device, or other equipment as approved by the Engineer. If a blower is used, compost shall be blown directly at the soil surface to help settle, compact and shape the berm. The berm shall be formed in a trapezoidal shape, having a typical dimension of 3 feet wide at the base and 1.5 feet high. Position the berm around designated soil areas and parallel to the contour. The ends of the berm shall be pointed up slope such that the bottom elevation at each end is higher than the top elevation throughout most of the slope, so as to prevent water from flowing around the end of the berms.
- C. Maintenance: Berms shall be reshaped and compost added as necessary to maintain their function and dimensions. Breaches in the berm shall be repaired promptly. Compost may be added by hand and tamped in place. Unless otherwise directed by the final landscape plans or by the Engineer, removal of the compost berm shall be made by spreading the compost in a thin layer over adjacent planted areas.

2154.11 Compost Filter Sock

A compost filter encased in a geotextile tube that serves a similar purpose to compost filter berms, particularly in areas with more concentrated overland runoff.

- A. Materials: Compost to be used in filter socks shall meet the respective requirements for compost specified in Section 2154.10 for Filter Berms.

Tubes used for compost filter socks shall be produced from a 5 mil thick continuous HDPE or polypropylene filament, woven into a tubular mesh netting material, with openings in the knitted mesh 1/8 in (3 mm) to 3/8 in (10 mm). Tubes shall have a diameter of either 8, 12, or 18 inches, as specified. The 12-inch tubes are for general use, the 8-inch tubes are typically for flat slopes, and the 18 inch tubes are typically for steep slope protection and minor check dams.

Stakes for securing filter socks shall be hardwood with a 2" by 2" nominal dimension. Steel or other non-biodegradable stakes shall not be used.

- B. Construction Requirements: Compost filter socks shall be constructed on site or delivered to the jobsite. When assembled on site, the sock shall be filled using a pneumatic blower. The sock shall be formed continuously for the length needed, up to 200 feet long. When multiple socks are needed, the end of one sock shall be pulled over the second to create a "sleeved" overlap. Once overlapped, the second section is filled with compost to create a seamless unit. Once placed, the filter sock will settle into an oval shape. Trenching is not required. Existing soil in the vicinity of the filter sock shall remain undisturbed to the extent practical. The sock shall be anchored by driving stakes through the center of the filter sock at 10 foot intervals, at all sleeved overlaps, and at each end. Where an adjustable section of filter sock is necessary (such as to permit dry weather vehicle access), the stakes may be placed on the downhill side of the sock rather than through it. Filter socks may be seeded.
- C. Maintenance: Compost filter socks shall be inspected to ensure the sock material is intact and to determine if runoff is bypassing or undermining the units. Additional filter socks may be stacked as needed. Breaches in the line shall be repaired promptly. Unless otherwise directed by the final landscape plans or by the Engineer, removal of the compost sock shall be made by spreading the compost in a thin layer over adjacent planted areas. The HDPE or polypropylene sock shall be sliced open longitudinally to release the compost and the sock disposed of.

2154.12 Diversion Berms

Earthen berms temporarily graded and compacted to provide a diversion of overland flow. Can be used in conjunction with slope drains at the top of slopes to prevent sheet flow down the slope face.

- A. Materials, Construction and Maintenance: Refer to the Standard Drawings.

2154.13 Slope Drain

A flexible tubing or conduit used to convey concentrated water from the top of a slope down to the toe and thereby preventing erosion over the slope face.

- A. Materials, Construction and Maintenance: Refer to the Standard Drawings.

2154.14 Inlet Protection

Any one of a variety of devices or procedures used to allow water to enter a stormwater inlet while filtering or temporarily impeding the flow sufficiently to reduce the quantity of sediment carried.

- A. Materials: When used, biodegradable logs, compost filter socks, synthetic sediment barriers, silt fence, or rock ditch checks shall meet the material requirements given by other items of this specification. All other material specifications are as shown in the Standard Details or on the plans. Straw wattles are not allowed for curb inlet protection. Unless otherwise restricted in the plans, the Contractor may also use any applicable inlet protection system allowed by KDOT Specification 902 and 2114 and the Standard Drawings or pre-approved materials list under the category "Temporary Inlet Sediment Barriers."
- B. Construction Requirements: Use the inlet protection systems shown on the plan, as appropriate. Provide the given system in accordance with the Standard Drawings. Alternate inlet protection methods may be approved or specified by the Engineer. The appropriate details for a given inlet will change during the progress of the job and adjustments shall be made as inlet construction progresses. Each inlet shall be protected continuously from initial construction until final stabilization. The ultimate test of acceptability is performance in preventing the migration of sediments through the inlet.

When surrounding conditions are such that protection of the inlet would lead to an increased risk of flooding of adjacent structures or produce a hazard to motorists, the barriers shall be adjusted or eliminated to avoid such impacts. In those cases, extra attention shall be paid to minimize the degree of sediment carried in the flow that reaches the inlet.

The general cases of inlet protection and the performance expected from each are as follows:

1. All Inlets at Sump Conditions: Inlets at sump conditions shall remain accessible for flow at all times. Small barriers, depressions and/or filters are used to screen larger sediments and initiate settlement of the water prior to it entering the inlet by creating a ponding zone. Generally, stormwater will enter the inlet via weir flow over the top of the barrier. Such water is generally the least-sediment laden as it is decanted from the top of the ponded area.
2. Street Inlets on Grade: On-grade inlet shall be converted into a localized sump condition by installing a barrier downstream and around the inlet of sufficient height to produce ponding and prevent bypass, while a barrier, depression, and/or filter in front of the inlet induces settlement of solids. Bypassing of water at the on-grade inlet shall not be allowed and the inlet shall remain open to accept flow without causing excessive flooding.

3. Selected Inlets Closed to Flow: In select locations, the plans may designate certain inlets as "closed to flow." In those situations, the objective is to provide sufficient blockage of permanent and temporary openings to prevent entry of stormwater into the inlet. Such locations will be clearly indicated on the plans, and the closed condition for flow may be designated for only a portion of the construction period. The Contractor shall notify the Engineer if they believe that the closure of such inlets would result in an increased risk of flooding or downstream erosion, and such concerns shall be resolved before closing an inlet to flow.
- C. Maintenance: Sediment shall be removed from each inlet after every rainfall event that exceeds 1/2" or which results in a visible accumulation of sediment. Particular attention shall be paid to prevent blockage of inlets or cases where resuspension of captured sediment is likely. Specific maintenance issues unique to each inlet protection type shall be addressed as outlined in the Standard Drawings.

2154.15 Construction Entrance

A stabilized layer of large aggregate and other features, located in areas of high traffic and at the construction entrance and exit, intended to remove mud and silt embedded in tires, to prevent tracking sediments off the site.

- A. Materials, Construction and Maintenance: See Standard Drawings.

2154.16 Sediment Trap

A temporary reservoir and embankment with a stone outlet that is constructed across a drainage way to intercept sediment-laden runoff and provide retention time sufficient to settle out a majority of solids. Used for smaller watersheds where the engineered outlet works of a sediment basin are not required.

- A. Materials: See Standard Drawings.
- B. Construction Requirements: See Standard Drawings. The construction of the sediment trap shall be carried out in a manner such that it does not result in sediment problems downstream. The embankment of the sediment trap shall be stabilized with temporary or permanent vegetation immediately after installation.
- C. Maintenance: See Standard Drawings.

2154.17 Sediment Basin

A temporary reservoir and embankment with engineered outlet works that is constructed across a drainageway to intercept sediment-laden runoff from large areas and provide retention time sufficient to settle out a majority of solids.

- A. Materials: See Standard Drawings.
- B. Construction Requirements: See Standard Drawings. Where the plans indicate that a temporary sediment basin is to be converted into a permanent basin, pond, or other stormwater facility, the construction, use, and removal or alterations shall be coordinated to result in a final facility that is operational in the time frame specified in the plans and which causes a minimum amount of disruption to the sitework, downstream channel, or future facility and minimizes the amount of rework needed. The construction of the sediment basin shall be carried out in a manner such that it does not result in sediment problems downstream. The embankment and emergency spillway of the sediment basin shall be stabilized with temporary or permanent

vegetation immediately after installation of the basin.

- C. Maintenance: See Standard Drawings.

2154.18 Temporary Stream Crossings

A temporary culvert constructed in a creek, river, or stream to allow construction access and crossing.

- A. Materials: See Standard Drawings.
- B. Construction Requirements: See Standard Drawings. Culvert sizing, number, and orientation shall be as dictated in the plans. Care shall be taken to ensure that the stream crossing does not cause inadvertent flooding of adjacent homes, buildings, or other structures. Concerns about adequacy of culvert sizing shall be brought to the immediate attention of the Engineer and no installation made until such concerns are resolved.
- C. Maintenance: See Standard Drawings.

2154.19 Diversion Channels

A temporary channel excavated and stabilized to divert flow from a stream around a culvert or other in-stream structure being constructed, so as to avoid excessive erosion in the construction zone.

- A. Materials: See Standard Drawings.
- B. Construction Requirements: See Standard Drawings. Diversions of streams shall only be allowed if covered by the plans and approved permits for the project. Such construction, stabilization, and restoration will conform the plans and Standard Drawings. Concerns about adequacy of culvert sizing shall be brought to the immediate attention of the Engineer and no installation made until such concerns are resolved.
- C. Maintenance: See Standard Drawings.

2154.20 Turbidity Curtains

Floating barriers of synthetic fabric curtain suspended in the water and held in a vertical position, used in lakes and perennial rivers to slow, contain or direct the flow from disturbed areas allowing solids to settle out before spreading into the surrounding water.

- A. Materials: All components shall conform to the requirements given for the specific turbidity curtain system specified in the plans.
- B. Construction Requirements: Shall conform to the manufacturer's recommendations for the curtain system specified in the plans, plus such additional requirements as may be listed in the plans. A manufacturer's representative shall be onsite during installation of the system.
- C. Maintenance: Anchor lines shall be kept secure and properly positioned. Fabric, cable, and other appurtenances shall be repaired immediately as needed and in accordance with manufacturer's instructions.

2154.21 Dewatering Filter

A device for filtering sediments from water that is discharged during pumping or dewatering activities.

- A.** Materials: Dewatering filters shall be constructed of materials as shown on the Standard Plans. Proprietary devices that provide equal or better performance than filters in the Standard Plans may be approved by the Engineer.
- B.** Construction Requirements: Dewatering filters shall be used whenever sediment- laden effluent is discharged from pumps used during construction for dewatering or other activities. For proprietary devices, the manufacturer's recommendations shall be followed.
- C.** Maintenance: Filters shall be cleaned or replaced as necessary to maintain filtration capacity.

END OF SECTION

TECHNICAL PROVISIONS

Section 2200

Paving



Unified Government of Wyandotte County

January 2022

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SECTION 2201 SUBGRADE PREPARATION

2201.1 Scope

This section governs the furnishing of all labor, materials and equipment for the preparation of subgrade as shown on the Plans and in accordance with the Standard Drawings, the specifications and the Special Provisions. This section includes subgrade preparation at locations which have been previously graded in accordance with the requirements of Section 2100 "Clearing, Grading, Excavation and Site Preparation".

2201.2 Referenced Standards

The following standards are referenced directly in this section. The latest version of these standards shall be used. If conflicting standards are referenced, the more stringent standard shall apply.

ASTM

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

2201.3 Definitions

- A. Subgrade: Subgrade is defined as a well graded and compacted layer on which base and subsequent courses are placed.
- B. Subgrade Preparation: Subgrade preparation is the repeated operation of fine-grading and compacting the subgrade until the specified lines, grades, and cross-section, as indicated on the Plans are obtained and the materials are compacted to the specified depth and density.

2201.4 Construction

- A. General: The subgrade surface shall be brought to the specified lines, grades and cross-section by adding or removing material and compacting to the specified density. Tolerance allowed on all lines, grades and cross-sections shall be no more than 1/4 inch.
- B. Compacting the Subgrade: Unless otherwise specified, the top 6 inches of subgrade for pavements shall be compacted to 95% of the standard proctor maximum density for the material used as determined by ASTM D 698 and within a tolerance of plus 3% and minus 3% of the optimum moisture content. The tolerance applies only to the top 6 inches.
- C. Protection and Maintenance of Subgrade: The subgrade shall be protected from action of the elements or others. Any action (e.g. settlement or erosion) that damages the subgrade or any subgrade that has become unacceptable prior to placing the pavement thereon, shall be repaired and the specific lines, grades, cross-section, tolerance, density, and moisture content range reestablished.
- D. Cleanup: Subgrade cleanup shall follow the work progressively. The Contractor shall remove from the project site all rubbish, surplus or discarded material, unsuitable material, and any equipment, tools and temporary construction items used for the preparation of the subgrade.
- E. Roll Testing: Once the subgrade has been brought to the final plan elevation, but prior to approval of the subgrade for paving, all lanes shall be roll tested in their entire length. The subgrade will not be acceptable if rutting, pumping, or deformation of the subgrade results from the roll test. This testing will be done by the contractor and will be in addition to the applicable moisture and density testing.

Equipment for roll testing shall be a tandem dump truck (one front and two rear axles) carrying a minimum load of twenty (20) tons.

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

SECTION 2202 SUBGRADE STABILIZATION

2202.1 Scope

This section governs the furnishing of all labor, materials and equipment for the stabilization of subgrade as shown on the Plans and in accordance with the Standard Drawings, the specifications and the Special Provisions. This work shall consist of the addition of self-cementing fly ash or lime to soil, mixing and compacting the material to the required density to develop a stabilized subgrade section. This applies to natural ground or fills and shall be constructed as specified herein and in conformity with the typical sections, lines and grades as shown on the Plans or as established by the Engineer.

2202.2 Referenced Standards

The following standards are referenced directly in this section. The latest version of these standards shall be used. If conflicting standards are referenced, the more stringent standard shall apply.

ASTM

- C 25 Standard Test Methods for Chemical Analysis of Limestone, Quicklime, and Hydrated Lime
- C 618 Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
- D 698 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft³ (600 kN-m/m³))
- D 1556 Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method
- D 5239 Standard Practice for Characterizing Fly Ash for Use in Soil Stabilization
- D 6938 Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

AASHTO

- T 99 Standard Method of Test for Moisture-Density Relations of Soils Using a 5.5 lb. Rammer and a 12 inch Drop
- M 216 Standard Specification for Lime for Soil Stabilization

2202.3 Materials

- A. Fly Ash: Fly Ash shall comply with the physical requirements of ASTM D 5239, paragraph 6.4 maintaining a minimum compressive strength of 500 psi at 7 days and the chemical requirements of ASTM C 618, Table 1 for Class C fly ash, unless otherwise shown on the Plans. The source of the ash shall be selected by the Contractor and approved by the Engineer in advance of stabilization operations in order that the required laboratory tests can be completed prior to construction without delaying the work. Certification shall be provided by the supplier that the fly ash used on the project meets the above criteria. Fly ash shall be stored and handled in closed weatherproof containers until distribution. Fly ash exposed to moisture prior to mixing with soils shall be discarded.
- B. Lime: Lime shall be hydrated or quicklime conforming to the requirements of AASHTO M 216. Contractor shall provide certification that the product complies. Hydrated lime shall contain not less than ninety (90) percent calcium hydroxide Ca(OH)_2 , and quicklime shall have a minimum available lime percentage (CaO) of 90%, as determined by ASTM C 25. Lime shall be introduced to the subgrade in a slurry form. When quicklime is used, slake it at the jobsite to manufacture hydrated lime slurry. The Contractor shall submit calculations to the Engineer that determines the amount of water needed to make a slurry with a percent solids between 20 and 40 percent. The Contractor will then determine the concentration strength of the lime slurry and the rate of application to obtain the lime percentage specified in the Contract Documents.
- C. Water: Water used for mixing shall be clean and potable. For lime stabilization, it shall be added during mixing,

remixing and compaction operations, and during the curing period to keep the cured material moist until covered. If water is not included in the Contract Documents as a pay item, it is subsidiary to other Contract items.

- D. Soil: The subgrade soil to be stabilized shall be uniform in quality and gradation and free from rubble, rubbish, vegetation, and stones larger than 1" diameter.

2202.4 Composition

Fly ash shall be applied at a rate determined by laboratory testing using the materials from the site and the specific fly ash to be supplied unless otherwise designated by the Contract Documents. Testing shall be the responsibility of the Contractor and is subsidiary to other items. The minimum application rate shall be 15% unless testing indicates otherwise.

Lime shall be applied at a rate determined by laboratory testing using the materials from the site and the specific lime to be supplied unless otherwise designated by the Contract Documents. Testing shall be the responsibility of the Contractor and is subsidiary to other items. The minimum application rate shall be 5% (by weight) unless testing indicates otherwise.

2202.5 Thickness

The thickness of the completed, compacted soil mixture shall be 6 inches or as called out in the Plans or Special Provisions. The thickness shall not be less than the specified minimum. Check thickness and when found to be ½ inch or more out of tolerance, the contractor shall correct the area represented by the checked location at no additional cost.

2202.6 Equipment

The machinery, tools, and equipment necessary for proper execution of the work shall be on the project and approved by the Engineer prior to beginning construction operations. Utilize spreading equipment capable of producing a consistent application rate. Blending of the soil mixture shall be accomplished by equipment with a recycling or mixing drum, positive depth control, and automatic water proportioning system that provides consistent results. Compaction shall be achieved using pneumatic or vibratory sheepsfoot or padfoot rollers capable of meeting the compaction requirements. Final surface compaction may be completed with a steel wheel or rubber-tired roller.

All machinery, tools and equipment use shall be maintained in a satisfactory and workmanlike manner.

2202.7 Construction

- A. General: It is the primary purpose of this specification to secure a completed section of treated material which contains a uniform mixture with no loose or segregated areas, has a uniform density and moisture content and is well bound for its full depth. It shall be the responsibility of the Contractor to regulate the sequence of his/her work, to process a sufficient quantity of material to provide a completed section as shown on plans, to use the proper amounts of fly ash or lime, to achieve final compaction within the specified time, to maintain the work, and to rework the lifts as necessary to meet the above requirements.
- B. Weather Limitations: The soil mixture shall not be mixed while the soil is frozen, the temperature is below 40°F or when conditions indicate that the atmospheric temperatures may fall below 40°F within 24 hours.
- C. Preparation of Subgrade: Before other construction operations are begun, the area to be stabilized shall be cut and shaped in conformance with the lines and grades shown on the plans. All areas shall be firm and able to support, without displacement, the construction equipment and the compaction hereinafter specified. Soft or

yielding subgrade shall be corrected by the Contractor using a method approved by the Engineer.

D. Moisture Control: Moisture control shall be achieved through use of a controllable water additive system capable of being regulated to the degree necessary to maintain moisture contents within the recommended range.

1. For fly ash, the required moisture content will be established by laboratory tests with the site soils and specific fly ash to be used, determined in accordance with ASTM D 698 or AASHTO T 99. Laboratory testing shall be the responsibility of the Contractor and is subsidiary to other items. Final moisture content of the mix, immediately prior to compaction shall be +/- 3 percentage points of the optimum moisture content as determined by laboratory testing unless otherwise specified in the Contract Documents. If moisture contents exceed the specified limits, additional fly ash may be incorporated to lower moisture contents to the required limits. Lowering moisture contents by aeration following addition of fly ash will not be allowed.
2. For lime, the required final moisture content of the lime-soil mix will be established by laboratory tests with the site soils and specific lime to be used, determined in accordance with ASTM D 698 or AASHTO T 99. Laboratory testing shall be the responsibility of the Contractor and is subsidiary to other items. During mixing and compaction operations, the moisture content of the mix shall be a minimum of 3 percentage points above the optimum moisture content as determined by laboratory testing, unless otherwise specified in the Contract Documents. After completion of the preliminary mixing operation and during the aging period, the surface shall be kept moist by spraying with water. Following the final mixing operation and compaction, the surface shall be kept moist by spraying with water until covered by a subsequent layer of material or sealed with a bituminous prime coat applied at a minimum rate of 0.15 gallons per square yard. Other curing methods may be submitted by the Contractor for consideration by the Engineer.

E. Application of Material

1. Fly Ash: Immediately prior to application of fly ash, the areas shall be scarified to allow for uniform distribution. The use of scarification equipment with positive depth control is required and should be performed to a depth between four inches (4") and one inch (1") less than the specified depth of treatment. The fly ash shall be spread only on that area where the placement, mixing and compaction operations can be completed within 2 hours.

The fly ash shall be spread uniformly over the top of the subgrade – the use of a controlled application system approved by the Engineer is preferred but the Contractor may submit an alternate method of spreading for approval that provides uniform distribution at the specified rate of application. The amount of fly ash spread shall be the amount required for mixing to the specified depth which will result in the percentage determined by laboratory testing as described in section 2202.4 Composition.

The fly ash shall be distributed in a manner that reduces the scattering of fly ash by wind to a minimum. Fly ash shall not be applied when wind conditions, in the opinion of the Engineer, are detrimental to a proper application or becomes objectionable to adjacent property owners.

The mixing operation shall be completed within 30 minutes of the addition of water to the subgrade.

2. Lime: Immediately prior to the application of the lime, the areas shall be scarified to allow for uniform distribution. The use of scarification equipment with positive depth control is required and should be performed to a depth between four inches (4") and one inch (1") less than the specified depth of treatment.

Lime slurry is to be applied with equipment that can regulate the amount passing through the nozzles

and the speed of travel to place the specified amount on the soil with a uniform lime distribution. The concentration of the lime slurry should allow for the application of the correct quantity of lime without adding an undue amount of excess moisture. The Contractor is responsible for testing the concentration of the lime suspension a minimum of once per day or once per batch, whichever is greater.

Application of the lime slurry should occur on the same day the slurry is produced. Continuously agitate the lime slurry once it is produced.

F. Mixing

1. Fly Ash: The full depth of the treated subgrade shall be mixed with a rotary pulv mixer which utilizes a direct hydraulic drive. Fly ash shall not be left exposed for more than 30 minutes after distribution. Water shall be added through a spray bar in the mixing drum capable of uniformly applying sufficient quantities of water to achieve the required moisture content of the soil-fly ash mixture. The system shall be capable of being regulated to maintain moisture contents within the recommended range.

Mixing shall continue until a homogeneous, friable mixture with zero clods greater than 1-1/2" in size remain and no more than 50% of the mixture is retained on a 1/2" sieve.

2. Lime: The mixing process for lime includes preliminary mixing, aging, and final mixing. The preliminary mixing should occur immediately following the introduction of the lime slurry to the subgrade. The equipment used for mixing shall have positive depth control with a visual depth indicator and be capable of mixing the full specified depth of treatment to within 1/2" tolerance. The mixing equipment should also have a travel speed indicator and controllable water additive system. Preliminary mixing shall continue until the material is uniformly mixed, at a minimum moisture content of 3% above optimum and with zero clods greater than 2" in size remaining. Perform a minimum of two passes over all treated areas with the mixer. Upon completion of the preliminary mixing, seal the mixture to prevent moisture loss by lightly rolling with a pneumatic or steel drum flat roller.

Aging should occur for a minimum of 24 hours and a maximum of 72 hours unless approved otherwise by the Engineer.

Following the aging period, the final mixing is performed by re-mixing the entire treated area until the mixture contains zero clods greater than 1.5" and has 95% of the mixture passing the 1" sieve and 60% of the mixture passing the No. 4 sieve. The mixture should be brought to a moisture content of a minimum of 3% above optimum for compaction.

G. Compaction

1. Fly ash: Compaction of the soil-fly ash mixture shall begin immediately after mixing of the fly ash and be completed within two hours following incorporation of fly ash. Compaction of the mixture shall continue until the entire depth of mixture is uniformly compacted to the specified density using vibratory sheepsfoot or pad foot rollers. A pneumatic rubber tire or smooth wheel steel drum roller may be used to complete the compaction of the surface. A test for both density and moisture content of the soil-fly ash mixture shall be taken for each 750 square yards of material placed with a minimum of one test per day of production. The field density of the compacted mixture shall be at least 95 percent of the maximum density established by laboratory tests using the site soils and specific fly ash to be used, determined in accordance with ASTM D 698. Laboratory testing shall be the responsibility of the Contractor and is subsidiary to other items.

The in-place field density shall be determined in accordance with ASTM D 1556 or ASTM D 6938. When ASTM D 6938 is utilized for testing purposes, the nuclear gauge shall be calibrated within the

last year. Calibration and operation of the gauge shall be in accordance with the requirements of the manufacturer. The operator of the nuclear gauge must show evidence of training and experience in the use of the instrument. The gauge shall be standardized daily in accordance with ASTM D 6938, paragraph 8.

Final acceptance of the compaction is dependent upon passing visual roll testing. This will be observed and approved by the Engineer. All irregularities, depressions, or weak spots which develop shall be corrected immediately by scarifying the areas affected, adding or removing material as required and remixing and re-compacting with additional fly ash if beyond the 2 hour limit. The surface of the course shall be maintained in a smooth condition, free from undulations and ruts, until other work is placed thereon or the work is accepted.

Should the material, due to any reason or cause, lose the required stability, density and finish before the work is accepted, it shall be reprocessed, recompacted and refinished at the sole expense of the Contractor. Reprocessing shall follow the same pattern as the initial stabilization including the addition of fly ash.

2. Lime: Compaction of the soil-lime mixture shall begin immediately after final mixing. Compaction of the mixture shall continue until the entire depth of mixture is uniformly compacted to the specified density using vibratory sheepsfoot or pad foot rollers. A pneumatic rubber tire or smooth wheel steel drum roller may be used to complete the compaction of the surface. A test for both density and moisture content of the soil-lime mixture shall be taken for each 750 square yards of material placed with a minimum of one test per day of production. The field density of the compacted mixture shall be at least 95 percent of the maximum density established by laboratory tests using the site soils and specific lime to be used, determined in accordance with ASTM D 698. Laboratory testing shall be the responsibility of the Contractor and is subsidiary to other items.

The in-place field density shall be determined in accordance with ASTM D 1556 or ASTM D 6938. When ASTM D 6938 is utilized for testing purposes, the nuclear gauge shall be calibrated within the last year. Calibration and operation of the gauge shall be in accordance with the requirements of the manufacturer. The operator of the nuclear gauge must show evidence of training and experience in the use of the instrument. The gauge shall be standardized daily in accordance with ASTM D 6938, paragraph 8.

Final acceptance of the compaction is dependent upon passing visual roll testing. This will be observed and approved by the Engineer. All irregularities, depressions, or weak spots which develop shall be corrected immediately by scarifying the areas affected, adding or removing material as required and remixing and re-compacting.

The surface of the course shall be maintained in a smooth condition, free from undulations and ruts, until other work is placed thereon or the work is accepted.

Should the material, due to any reason or cause, lose the required stability, density and finish before the work is accepted, it shall be reprocessed, recompacted and refinished at the sole expense of the Contractor.

H. Finishing (Trimming) & Curing

1. Fly ash: After each layer or course of the fly ash treated subgrade has been compacted, it shall be brought to the required lines and grades in accordance with the typical sections. The finished surface of the final layer shall not vary more than 3/8 inch when tested with a 10-foot straightedge applied parallel with and at right angles to the pavement centerline. Any variations in excess of this tolerance shall be corrected by the Contractor, at his/her own expense, in a manner satisfactory to the Engineer.

After the fly ash treated course has been finished as specified herein, the surface shall be protected against rapid drying by one of the following methods for a period of not less than three days or until the pavement section is placed.

- a. Maintain in a thorough and continuously moist condition by sprinkling with water.
- b. Apply an asphalt prime coat emulsion curing seal approved by the Engineer at a rate of 0.15 gallons per square yard.
- c. Other options for maintaining moisture may be submitted in writing for approval by the Engineer.

Restrict construction traffic from operating on the treated subgrade until it can withstand the loads without damage or deformation.

Protect the treated subgrade from freezing throughout the protection period.

2. Lime: After each layer or course of the lime treated subgrade has been compacted, it shall be brought to the required lines and grades in accordance with the typical sections. The finished surface of the final layer shall not vary more than 3/8 inch when tested with a 10-foot straightedge applied parallel with and at right angles to the pavement centerline. Any variations in excess of this tolerance shall be corrected by the Contractor, at his/her own expense, in a manner satisfactory to the Engineer. After the lime treated course has been finished as specified herein, the surface shall be cured by one of the following methods for a period of not less than three days and maintained until placement of the subsequent course (base or pavement) or up to seven days, whichever occurs first:

- a. Maintain in a thorough and continuously moist condition by sprinkling with water.
- b. Apply an asphalt prime coat emulsion curing seal approved by the Engineer at a rate of 0.15 gallons per square yard.
- c. Other options for a curing seal may be submitted in writing for approval by the Engineer.

Restrict all construction traffic (except watering equipment) from operating on the treated subgrade during the curing period. Restriction may be lifted after three days if treated subgrade has gained sufficient strength to withstand the loads without damage or deformation.

Protect the subgrade from freezing throughout the curing period.

- I. Maintenance: The contractor shall maintain, at his/her own expense, the entire treated subgrade in good condition from the start of work until all the work has been completed, cured, and the pavement is placed.

SECTION 2203 AGGREGATE BASE COURSE

2203.1 Scope

This section governs the furnishing of all labor, materials and equipment for the placement of aggregate base course and underdrains, including pipe, geotextiles and granular filter material as shown on the Plans and in accordance with the Standard Drawings, the specifications and the Special Provisions.

2203.2 Referenced Standards

The following standards are referenced directly in this section. The latest version of these standards shall be used. If conflicting standards are referenced, the more stringent standard shall apply.

ASTM

- C 31 Standard Practice for Making and Curing Concrete Test Specimens in the Field
- C 33 Standard Specification for Concrete Aggregates
- C 39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
- C 88 Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
- C 117 Test Method for Materials Finer than 75 μ m (No. 200) Sieve in Mineral Aggregates by Washing
- C 131 Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- C 136 Test Method for Sieve Analysis of Fine and Coarse Aggregates
- C 142 Test Method for Clay Lumps and Friable Particles in Aggregates
- C 150 Standard Specification for Portland Cement
- D 75 Practice for Sampling Aggregates
- D 695 Test Method for Compressive Properties of Rigid Plastics
- D 1621 Test Method for Compressive Properties Of Rigid Cellular Plastics
- D 2419 Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
- D 3034 Specification for Type PSM Polyvinyl Chloride (PVC) Sewer Pipe and Fittings
- D 3666 Specification for Minimum Requirements for Agencies Testing and Inspecting Bituminous Paving Materials
- D 4318 Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
- D 4716 Test Method for Determining the (In-plane) Flow Rate per Unit Width and Hydraulic Transmissivity of a Geosynthetic Using a Constant Head
- D 4791 Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
- D 5821 Standard Test Method for Determining the Percentage of Fractured Particles in Coarse Aggregate
- F 758 Standard Specification for Smooth-Wall Polyvinyl Chloride (PVC) Plastic Underdrain Systems for Highway, Airport, and Similar Drainage

AASHTO

- M 252 Corrugated Polyethylene Drainage Tubing
- T 99 The Moisture-Density Relations of Soils Using a 5.5-lb. (2.5 kg) Rammer and a 12-in. (305 mm) Drop

2203.3 Materials

- A. Untreated Compacted Aggregate: This base course material shall consist of crushed stone aggregate with not more than 1.0% clay lumps and friable particles in accordance with ASTM C 142, and free from vegetable or other deleterious substances. The abrasion loss shall be no more than 35% when tested in accordance with ASTM C 131. That fraction passing the 1 inch sieve and retained on the No. 4 sieve shall have a loss not greater than 18% by weighted average for magnesium sulfate method (12% maximum loss if tested using sodium sulfate method) of ASTM C 88 Soundness Test at 5 cycles. That fraction of the material passing the 1-inch sieve and retained on the No. 4 sieve shall contain less than 20% by weight of flat and elongated particles

when tested in accordance with ASTM D 4791 (flat being a ratio of 1 to 3 between thickness and least width and a ratio of 1 to 3 between the least width and length). The material shall consist of angular particles with no less than 90% of particle count having two or more fractured surfaces. The gradation in percentages by weight passing square mesh sieves shall be in accordance with ASTM C 136 and as follows:

Sieve Designation (Square Opening)	Percentage by Weight Passing Sieve
1-1/4 in (31.5 mm)	100
1 in (25.0 mm)	72 – 100
3/4 in (19.0 mm)	60 – 90
3/8 in (9.5 mm)	43 – 74
No. 4 (4.75 mm)	28 – 60
No. 10 (2.00 mm)	16 – 40
No. 40 (425 um)	3 – 22
No. 200 (75 um)	0 – 15

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

That fraction of the material passing the No. 40 sieve shall have a plasticity index not to exceed 8 when tested in accordance with ASTM D 4318.

- B. Drainable Base: All drainable base materials shall have a minimum coefficient of permeability of 1000 ft/day as determined by the test method described in 2203.4.E Permeability Test Procedure.
1. Portland Cement Concrete Drainable Base: This item shall consist of an open-graded drainable base composed of mineral aggregate, Portland cement and water mixed in a central mixing plant and placed on a prepared course in accordance with these specifications and shall conform to the lines, grades, thicknesses and typical cross sections shown on the Plans.
 - a. Coarse Aggregate
 - i. General: Coarse aggregate shall be 3/4 inch maximum size consisting of crushed gravel or crushed stone and shall meet the requirements of ASTM C 33 and quality requirements of 2203.3.A.
 - ii. Gradation shall be ASTM C 33, Size 67.
 - b. Fine Aggregate: Fine aggregate shall consist of natural sand or manufactured sand meeting the requirements of ASTM C 33.
 - c. Cement: Portland cement shall conform to the requirements of ASTM C 150, Type I or Type II. Substitution of fly ash or other pozzolan for Portland cement shall be in conformance with Section 2208.
 - d. Water: Water used in mixing or curing shall be clean and free of oil, salt, acid, alkali, sugar, vegetable or other substances injurious to the finished product as possible. Water known to be of potable quality may be used without testing.
 - e. Admixtures: The use of any material to be added to the mixture shall be approved by the Engineer.
 - f. The Contractor shall furnish vendor's certified test reports for the materials used in the project. The report shall be delivered to the Engineer as part of the mix design before permission to use the materials is granted.
 - g. Proportions: The Contractor shall submit a mix design containing the quantity of each material to the Engineer including certifications of materials used. The Contractor will be responsible for preparing the drainable base mix design at no cost to the Owner. The testing laboratory preparing the mix design shall comply with Section 2203.3.B.2.e. The mix design shall include

the following:

Cement Content
Water-Cement Ratio - Approximately 0.36
Coarse Aggregate
Fine Aggregate
All Admixtures
Coefficient of Permeability - Tested per Section 2203.4.E

- h. Compressive Strength: Proportions will be such to produce a compressive strength of 800 psi in 28 days as determined by test cylinders made in accordance with ASTM C 31 and tested in accordance with ASTM C 39. A strength of 500 psi will be required prior to any traffic being allowed on the surface.
2. Plant Mix Bituminous Drainable Base: This item shall consist of an asphalt stabilized drainable base course composed of mineral aggregate and bituminous material mixed in a central mixing plant and placed on a prepared course in accordance with the specifications and shall conform to the lines, grades, thicknesses, and typical cross sections shown on the Plans. Each course shall be constructed to the depth, typical section, or elevation required by the Plans and shall be rolled, finished, and approved before the placement of the next course. A prime coat will be used on the subbase prior to placement of the first course, and no tack coat will be used between courses.
- a. Aggregate: Aggregate shall consist of crushed stone or crushed gravel and be free of organic materials.
 - i. Coarse Aggregate: Coarse aggregate shall comply with Section 2203.3.A except wear may not exceed 50 % in accordance with ASTM C 131.
 - ii. Aggregate shall contain at least 70% by weight of individual pieces having two fractured faces and 85% by weight having at least one fractured face as determined by ASTM D 5821.
 - iii. The aggregate shall not contain more than 8%, by weight, of flat and elongated pieces, when tested in accordance with ASTM D 4791 (ratio = 5:1).
 - iv. Sampling: ASTM D 75 shall be used in sampling the coarse aggregate.
 - b. Bituminous Material: The asphalt cement shall be in conformance with Section 2205.3.A. The type and grade of asphalt used shall be specified in the mix design but shall not be lower than a PG 64-22.
 - c. Preliminary Material Acceptance: Prior to delivery of materials to the job site, the Contractor shall submit certified test reports to the Engineer for the following materials:

Coarse Aggregate - Percent of wear, soundness.

Bituminous Material - The certification(s) shall show the appropriate ASTM test(s) for each material, the test results, and a statement that the material meets the specification requirements.
 - d. Job Mix Formula. (JMF): No bituminous mixture for payment shall be produced until the Engineer has approved a JMF in writing. The method of determining the proper asphalt content is to store the mix trial batches in the laboratory overnight (15-18 hrs) at 140°F. The proper asphalt content will then be selected visually.

The asphalt content mix is selected from the batch from which a small amount of asphalt drains to the bottom of the pan and the mix still appears glossy. A heat resistant, clear glass dish may be used for better visibility of the drained asphalt. The asphalt content may be

varied as necessary during construction to meet this requirement.

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

TABLE 2. PLANT MIX BITUMINOUS DRAINABLE BASE MASTER GRADATION	
Sieve Designation (Square Opening)	Percent by Weight Passing Sieve
1-1/2 in (37.5 mm)	100
1 in (25.4 mm)	90 – 100
3/4 in (19.0 mm)	75 – 100
1/2 in (12.5 mm)	70 – 90
3/8 in (9.5 mm)	50 – 70
No. 4 (4.75 mm)	20 – 40
No. 8 (2.36 mm)	15 – 25
No. 30 (637 um)	5 – 15
No. 200 (75 um)	0 – 3

Recommended Asphalt Cement Content 2.0% – 3.5%

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

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

TABLE 3. JOB MIX FORMULA TOLERANCES (Based on Single Test)	
Material	Tolerance Plus or Minus
Aggregate passing No. 4 (4.75 mm) sieve or larger	5.00%
Bitumen*	0.40%
Temperature*	20 degrees F

*Unless otherwise approved by the Engineer.

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

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

Dry aggregate gradations will be made at least twice daily. The aggregate gradation shall be tested by the Contractor in accordance with ASTM C 117 and C 136 and the results submitted to the Engineer within 24 hours.

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

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

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

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

C. Underdrains: Underdrains shall consist of the following materials unless otherwise specified in the Plans, Standard Drawings, or Contract Documents.

1. Aggregate: Blanket underdrain aggregate and pipe underdrain aggregate shall be clean or washed aggregate and conform to requirements of Section 2203.3.A with the following gradations:

TABLE 4. BLANKET UNDERDRAIN AGGREGATE	
Sieve Designation (Square Opening)	Percent by Weight Passing Sieve
1-1/2 in (37.5 mm)	100
1 in (25.4 mm)	90 – 100
3/4 in (19.0 mm)	60 – 90
3/8 in (9.5 mm)	-----
No. 4 (4.75 mm)	20 – 40
No. 8 (2.36 mm)	-----
No. 16 (1.2 mm)	0 – 10
No. 30 (0.6 mm)	-----
No. 50 (0.3 mm)	0 – 7
No. 100 (150 um)	0 – 2

TABLE 5. PIPE UNDERDRAIN AGGREGATE	
Sieve Designation (Square Opening)	Percent by Weight Passing Sieve
1-1/2 in (37.5 mm)	-----
1 in (25.4 mm)	-----
3/4 in (19.0 mm)	100
3/8 in (9.5 mm)	85 – 100
No. 4 (4.75 mm)	-----
No. 8 (2.36 mm)	40 – 60
No. 16 (1.2 mm)	-----
No. 30 (0.6 mm)	5 – 30
No. 50 (0.3 mm)	-----
No. 100 (150 um)	1 – 2

2. Underdrain Pipe

- a. Polyvinyl chloride pipe shall meet the requirements of ASTM F 758/D 3034.
 - b. Corrugated Polyethylene Tubing may be used only outside of traffic areas and driving surfaces. The tubing shall be the heavy duty type and shall meet the requirements of AASHTO M 252. In addition, the tubing shall have a minimum pipe stiffness of 30 psi at 10% deflection.
 - c. All underdrain pipes shall have a nominal minimum inside diameter of six inches unless shown otherwise on the Plans.
 - d. Perforations shall be approximately circular and cleanly cut; shall have nominal diameters not less than 3/16-inch nor more than 3/8-inch; and shall be arranged in at least two rows parallel to the axis of the pipe.
 - e. Fittings shall be of the same composition and have the same physical properties as the pipe and shall not restrict flow.
3. Geocomposite Edge Drain
- a. Edge drain shall consist of a plastic core completely surrounded by geotextile. The core shall provide a minimum of 10 percent open area to facilitate water entry or cross flow and shall be composed of plastic which is physically and chemically stable under a normal range of conditions.
 - b. The edge drain shall have nominal dimensions of 1 to 1-1/2 inches in thickness and 12 inches in height.
 - c. The edge drain shall have a minimum flow capacity of 15 gallons per minute per foot of width as determined by ASTM D 4716 when tested under a confining stress of 10 psi or more at a gradient of 0.1 or less.
 - d. The edge drain shall have a minimum compressive strength of either 7,000 psf at a maximum deformation of 10 percent of the original thickness when tested in accordance with ASTM D 1621, or 8,000 psf at a maximum deformation of 20 percent when tested in accordance with ASTM D 695.
 - e. Geotextile shall have an apparent opening size (AOS) corresponding to a U.S. sieve number greater than 50 but not exceeding 100.
4. Geotextile: Geotextile for use with pipe and edge underdrains shall be a nonwoven geotextile and shall meet the requirements of Section 2605.2.C.

2203.4 Construction

A. Untreated Compacted Aggregate

- 1. Subgrade: Prior to placement of base course material the previously prepared subgrade surface shall be cleared of all foreign substances and restored in shape, tolerance and density as specified in Section 2201 entitled "Subgrade Preparation".
- 2. Material Placement: The material shall be uniformly spread in successive layers to such depth that when compacted, the base will meet the minimum thickness specified. The Contractor may construct the base in any number of layers that he chooses except that in no case shall any individual layer have a compacted thickness of more than 6 inches. Each layer shall be compacted as hereinafter specified before any succeeding layer is placed.
- 3. After spreading a layer of material, water in an amount sufficient to insure the desired compaction shall be added and uniformly mixed with the aggregate in a manner to prevent segregation. Excess moisture resulting in runoff shall be avoided. If for any reason, the material and subgrade become too wet to permit satisfactory work, they shall be allowed to dry to a moisture content that will permit

satisfactory work.

4. The material shall meet the required specifications immediately before compaction operations are commenced. If, for any reason, segregation occurs in excess of 10% variation from the gradation required by this specification or the materials become contaminated, such segregated or contaminated materials shall be removed and replaced with suitable materials at the expense of the Contractor. The limited segregation of 10% variation will be ascertained by a sieve analysis of a minimum 100 pound sample taken from the in-place base course.
5. However, for untreated compacted aggregate base, segregated surface areas may be corrected by adding limestone screenings of such gradation and quantity as required to fill the surface voids and firmly bind the loose material in place. Screenings so used in correcting segregated surface areas will be subsidiary.
6. Shaping and compacting shall be carried on continuously until a true, even and uniform surface of proper grade and cross-section is obtained, and until the density of the complete base is at least 95% of maximum density as determined by AASHTO T 99. The proper moisture content shall be maintained by wetting the surface as required during shaping and compacting operations. Final rolling shall be accomplished by use of a self-propelled smooth-wheeled roller.

B. Portland Cement Concrete Drainable Base

1. Spreading: The base material shall be spread to the lines and grades shown on the Plans. Any material which becomes mixed with soil or other contaminants shall be removed and replaced with fresh mixture.
2. Compaction: After spreading and/or trimming, the base material shall be uniformly compacted by making a minimum of 2 coverages with a steel wheeled roller meeting the requirements of Section 2205.8.B. The compaction process may be adjusted on the project by the Contractor with approval of the Engineer to assure uniform compaction of the drainable base material. In areas not accessible by the roller, the base material shall be compacted by mechanical hand methods. Compaction must be completed within 2 hours of the time water is introduced to the mixture.
3. If after spreading and compacting the base is not to the required lines and grade, the Contractor shall trim the base by means of an electronically controlled machine utilizing string line controls for grade. The Engineer reserves the right to direct the Contractor to suspend all operations if the Contractor produces excessive fines in the trimming process which are viewed by the Engineer to be detrimental to the permeability of the base. Appropriate corrections to the trimming process shall be made by the Contractor prior to beginning again.
4. After compaction of the drainable base, the Contractor shall protect the surface from damage and/or contamination. If the integrity of the drainable base is disturbed at any time prior to placement of the succeeding pavement course the area shall be removed and replaced with new material and compacted to conform to the original lines and grades at the Contractor's expense. Any removed material shall not be reincorporated into the drainable base or other drainage features.
5. Curing Of The Drainable Base Material: The Contractor will be required to provide a curing plan to the Engineer.
6. Temperature Limitations: The air temperature must be between 50°F and 90°F for drainable base construction. The Engineer may order operations to cease in hot windy conditions if it appears the mixture is drying out prior to achieving initial set.

7. Construction Joints: The formation of all joints shall be made in such a manner as to ensure a continuous bond between old and new sections of the course. All joints shall present the same texture and smoothness as other sections of the course.
8. All contact surfaces of previously constructed courses shall be cleaned of all dirt or other objectionable materials, and thoroughly moistened with water prior to placing the new material.
9. Thickness: The thickness of the base course may be measured by cores taken at intervals determined by the Engineer.

C. Plant Mix Bituminous Drainable Base

1. Test Section: Prior to full production, the Contractor shall prepare and place a section of drainable base according to the JMF. The amount of mixture should be 80 tons and may be placed as part of the project. The underlying grade or pavement structure upon which the test section is to be constructed shall be the same as the remainder of the course represented by the test section. The equipment used in construction of the test section shall be the same type and weight to be used on the remainder of the course represented by the test section.
2. Two random samples of mixture may be taken at the plant and tested for aggregate gradation and asphalt content. The test section shall be considered acceptable if the gradation and asphalt content are within the limits specified in Tables 2 and 3.
3. If the initial test section should prove to be unsatisfactory to the Engineer, the necessary adjustments to the JMF, plant operation, placing procedures, and/or rolling procedures shall be made. A second test section shall then be placed. If the second test section also does not meet specification requirements, both sections shall be removed at the Contractor's expense. Additional test sections, as required, shall be constructed and evaluated for conformance to the specifications. Any additional sections that do not conform to specification requirements shall be removed at the Contractor's expense. Full production shall not begin until a satisfactory section has been constructed and accepted by the Engineer. The test sections that meet the specification requirements shall be paid for in accordance with project quantities.
4. The Contractor shall perform job mix control testing at the start of plant production and in conjunction with the calibration of the plant for the JMF. It should be recognized that the aggregates produced by the plant may not satisfy the gradation requirements or produce a mix that exactly meets the JMF. In those instances, it will be necessary to reevaluate and redesign the mix using plant-produced aggregates. Specimens should be prepared and the optimum bitumen content determined in the same manner as for the original design tests.
5. Weather Limitations: The bituminous mixture shall not be placed upon a wet surface or when the surface temperature of the underlying course is less than 40 degrees F or the wind chill factor is less than 35 degrees F. The temperature requirements may be waived by the Engineer; however, all other requirements including compaction shall be met.
6. These materials will be placed, handled, hauled and accepted based on requirements of Section 2205.

D. Underdrains

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

2. Excavation

- a. Trenches for all lateral and longitudinal underdrains shall be excavated to the dimensions, depths and elevations shown on the Plans or Standard Drawings or as ordered by the Engineer. In case of a conflict, where the actual elevation of the strata or stratum to be intercepted is found to vary from Plan elevation, the stratigraphy shall govern in the installation of underdrains.
- b. Trench bottoms for perforated pipe underdrain and edge drain shall be in firm material (no mucky or soupy condition existing) and constructed to permit the placing of three inches (3") of aggregate underneath the pipe. If unstable material is encountered in the bottom of the trench, the trench shall be over excavated to firm material.
- c. Minimum width of trench shall be as shown in the Plans or in the specifications or the Standard Drawings.

3. Laying Pipe

- a. All underdrain pipe shall be laid carefully to Plan line and grade.
- b. All pipe shall be laid on a minimum grade of one percent unless otherwise shown on the Plans.
- c. All dead ends of pipe underdrains shall be completely closed with a cap of the same material as the pipe.
- d. All junctions and turns shall be made with wyes, tees, and bends as supplied by the manufacturer of the pipe.
- e. Perforations shall be laid down unless otherwise indicated on the Plans.

4. Installing Edge Drain

- a. Installation shall be in accordance with manufacturer's instructions.
- b. Each length of drain shall be joined to the adjacent length prior to installation. Splices shall keep adjoining lengths in proper alignment, shall not separate during installation, shall have the same or greater compressive strength than the geocomposite drain, and shall be sealed against infiltration of backfill material.
- c. Drain shall be placed in the center of the trench and held in place with a temporary support while blanket underdrain aggregate backfill is placed.
- d. The placement of the edge drain and the first lift of backfill shall be accomplished in a single continuous operation.

5. Backfilling

- a. Backfilling the trenches of lateral and longitudinal underdrains shall not be started until approved by the Engineer.
- b. The trenches shall be backfilled to the specified elevations and in accordance with the Plans, specifications or Standard Drawings.
- c. The backfill material shall be placed in such a manner as to prevent formation of large cavities in the backfill and walls of the trench.
- d. Overbreakage due to blasting of rock in trench excavation and widening due to caving of trench walls or overbreakage at construction outcrops shall be backfilled with aggregate approved by the Engineer.

E. Permeability Test Procedure for Drainable Base

This test method is used to determine the permeability of unbound and bound aggregate base material. Bound base material will use Portland cement or asphaltic cement as a cementing agent.

1. Unbound Base and Base Bound with Portland Cement

a. Apparatus

- i. Mold: A cylindrical metal mold with an approximate inside diameter of 6" and a minimum height of 6". The mold shall be equipped with a removable collar at least 2" in height and a removable base plate. The base plate may be used as part of the permeability test equipment. If so, the base plate must exceed the permeability of the material being tested. A #40 screen shall be placed on top of the base plate to prevent test material from being lost through the base plate during compaction and permeability testing.
- ii. Standpipe: A standpipe with the same diameter as the removable collar for the mold with a minimum height of 8.5". The standpipe shall be equipped with an overflow outlet.
- iii. Rammer: A mechanically operated metal rammer equipped to control the height of drop to 12" plus or minus 1/16" above the elevation of the sample. The rammer shall be equipped to distribute the blow uniformly over the sample surface. The rammer shall have a rigid flat faced "pie shaped" foot and a nominal weight of 5.50 lbs. The "pie shaped" foot shall be a sector of 6" diameter circle and shall have an area equal to that of a 2" circular foot.
- iv. Straight edge: A rigid steel straight edge with one edge beveled, at least 8" in length.

b. Sample preparation

- i. Obtain a 50 lb. to 60 lb. sample, dry if necessary.
- ii. Mix a sufficient amount of aggregate and cementing agent, if required, to fill the mold 1 and 1/2 times.
- iii. Add the appropriate amount of water and thoroughly mix.
- iv. Place the assembled mold on the rigid base and fill approximately 1/2 full of the loose moist material. Compact the layer with 25 blows of the rammer with the blows being distributed uniformly over the surface of the layer. Place three additional approximately equal layers of material in the mold and compact each layer in a similar manner (four layers total).
- v. After the fourth layer has been compacted, remove the collar and trim excess material level with top of the mold.
- vi. Cure Portland cement treated specimens by covering with plastic, to prevent drying for 3 days at room temperature.
- vii. Unbound specimens do not need to be cured before testing.

2. Asphalt Bound Aggregates

a. Apparatus

- i. Mold: A cylindrical mold with an inside diameter of approximately 6" and a minimum length of 4.5". The mold is open at each end and is equipped with a removable collar and a base plate about 0.5" thick.
- ii. Specimen Mold Holder: The specimen mold holder has a semi-circular base and a flanged top to hold the specimen mold in place during the compaction process. Any equivalent hold down device that performs the same function is satisfactory.
- iii. Compaction Hammer: The compaction hammer consists of a hammer having a flat circular tamping face 5.88" in diameter and appropriate extension rod with handle which acts as guide for a free falling weight. The weight shall weigh 22.5 lbs. and have a free fall of 18" plus or minus 0.1". The hammer may be operated manually or

- be driven with a motor.
 - iv. **Compaction Pedestal:** The compaction pedestal is a wood block approximately 12" x 12" x 18". A 12" x 12" x 1" steel plate is securely fastened to the top of the block. The pedestal is set on and securely fastened to a solid concrete slab with the vertical axis plumb and the top level.
 - v. **Heating Equipment:** Ovens or hot plates for heating aggregates, bituminous material, specimen molds, compaction hammers and other associated items required for mixing and molding. It is recommended that, when possible all heating units be thermostatically controlled to maintain the required temperature within $\pm 5^{\circ}\text{F}$. Suitable shields, thick steel plates or pans of sand shall be used on the surfaces of hot plates to minimize locally overheating.
 - vi. **Mixing Apparatus:** Mechanical mixing is recommended. Any type of mechanical mixer may be used provided it will produce a well coated, homogeneous mixture of the required amount in the allowable time and further that the mixing paddle or whip does not fracture or pulverize aggregate fractions during the mixing process. The bowl employed with the mixer shall be such a nature that essentially all of the batch can be removed. More than one mixing bowl is recommended unless the mixer is equipped with a heating jacket to keep the bowl heated during the mixing process.
- b. **Determination of Mixing and Compacting Temperature**
 - i. The temperature to which the asphalt cement must be heated to produce a viscosity of 85 ± 10 SFS shall be the mixing temperature.
 - ii. The temperature to which the asphalt cement must be heated to produce a viscosity of 130 ± 15 SFS shall be the compacting temperature.
- c. **Sample Preparation for Laboratory Prepared Mix**
 - i. Combine the dry individual aggregates to produce desired combined aggregate with a batch weight of approximately 8.9 lbs. This should be sufficient to produce a compacted specimen 3.75 ± 0.125 inches thick. Adjust the weight of the batch as needed to produce a compacted specimen of 3.75 ± 0.125 inches thick.
 - ii. Prepare a minimum of two aggregate and asphalt specimens. The first specimen shall be mixed and thrown away. This sample is to "butter" the mixing bowl and paddle and thus reduce material loss when mixing the test specimen.
 - iii. Heat the aggregate and asphalt within the limits of mixing temperature determined in Section 2203.4.E.2.b. Charge the mixing bowl with the heated aggregate and form a crater in the top. Add the required amount asphalt and mix the aggregate and asphalt until coated at least 2 minutes. Care should be taken to keep all of the sample in the mixing bowl during this process.
- d. **Compaction of Specimen**
 - i. Prior to the addition of the asphalt to the batches, thoroughly clean the specimen mold assembly and the face of the compaction hammer and heat the mold assembly and hammer to a temperature between 200°F and 350°F . Assemble the mold, base plate and collar and place a paper disc cut to size in the bottom of the mold.
 - ii. Place the hot batch of aggregate-asphalt mixture in the mold, spade vigorously with a heated spatula or trowel 15 times around the perimeter and 10 times over the interior of the mold. Smooth the surface of the mix to a slightly rounded shape. The temperature of the mix prior to compaction shall be within the limits in Section 2203.4.E.2.b. Place a paper disc on top of the mix.
 - iii. Place the mold assembly, including the collar, on the pedestal, fasten securely with the mold holder and apply 20 blows with the compaction hammer. Each blow must have the prescribed free fall of 18" with the axis of the compaction hammer held perpendicular to the base of the mold assembly during the compaction process. Remove the base plate and collar, and reverse and reassemble the mold. Apply the specified number of blows to the reversed specimen. After compaction remove the mold assembly from the pedestal, remove the collar and base plate and cool the

specimen in the mold until the mold can be handled comfortably with bare hands. Asphalt treated samples do not need to be cured before testing, only cool to the touch.

3. Test Procedure

- a. Assemble test equipment, base plate, mold with specimen, and standpipe.
- b. Prior to conducting the test, allow a sufficient amount of water to pass through the specimen to cause all air to be expelled from the specimen. (Establish reservoir around the base with water open to atmospheric pressure.)
- c. Conduct Constant-Head Permeability test and report coefficient of permeability "k". Repeat a minimum of two additional times until two runs agree reasonably well.
- d. Constant-Head Permeability:

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

Q = quantity of water discharged (volume)

L = length of specimen

A = cross-sectional area of specimen

h = hydraulic head (height column of water above discharge)

t = elapsed time of test

k = coefficient of permeability (length/time)

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

SECTION 2204 PRIME AND TACK COAT

2204.1 Scope

This section governs the furnishing of all labor, materials and equipment for the application of liquid asphalt to a prepared pavement (concrete, asphaltic concrete), or granular base as shown on the Plans and in accordance with the Standard Drawings, the specifications and the Special Provisions.

2204.2 Referenced Standards

The following standards are referenced directly in this section. The latest version of these standards shall be used. If conflicting standards are referenced, the more stringent standard shall apply.

ASTM

D 140 Practice for Sampling Bituminous Materials

2204.3 Materials

- A. The type and grade of asphalt material to be used as prime or tack coat shall be designated by the Engineer in the Plans or in the Special Provisions. If not specified in the Plans or Special Provisions, the Contractor shall submit proposed type and grade of asphalt material to the Engineer for approval. The liquid asphalt material to be used for surface preparation shall be as listed in the following table:

Material to be Treated	Application Usage	Type of Emulsion of Grade of Cutback	Application Rate (Gal/SY) (L/SM)	Application Temperature °F (°C)	Cure Time at 70°F (21°C)
Existing Asphalt or Concrete Surface	Tack	RC-70	0.05-0.10 Gal/SY (0.23-0.46 L/SM)	150 – 225 (65 – 107)	1 – 6 hrs
	Tack	SS-1 SS-1h CSS-1 CSS-1h	0.05-0.15 Gal/SY (0.23-0.69 L/SM)	70 – 160 (22.5 – 42)	1 – 3 hrs
Treated Base (lime, flyash, cement)	Prime	MC-30 MC-70	0.1-0.3 Gal/SY (0.46-1.38 L/SM)	85 – 120 (29 – 49)	12 – 24 hrs
	Prime	SS-1 SS-1h CSS-1 CSS-1h	0.1-0.3 Gal/SY/in (0.46-1.38 L/SM/mm)	70 – 160 (20 – 70)	24 – 48 hrs
Untreated Aggregate Base w/ Fines	Prime	MC-30 MC-70	0.1-0.3 Gal/SY (0.46-1.38 L/SM)	85 – 120 (29 – 49)	12 – 24 hrs
Untreated Aggregate Base w/o Fines	Prime	MC-250	0.2-0.5 Gal/SY (0.92-2.30 L/SM)	85 – 120 (29 – 49)	12 – 24 hrs
Untreated Aggregate Base	Prime	SS-1 SS-1h CSS-1 CSS-1h	0.1-0.3 Gal/SY/in (0.46-1.38 L/SM/mm)	70 – 160 (20 – 70)	24 – 48 hrs
	Prime	EAP PAE, or PEP	0.1-0.3 Gal/SY (0.46-1.38 L/SM)	70 – 160 (20 – 70)	12 – 24 hrs

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

- B. Sand Cover, if used, shall be any clean granular mineral meeting the following grading requirements. When tested with laboratory sieves 100% shall pass the No. 4 (4.75 mm) sieve and not more than 2% shall pass the No. 200 (75 µm) sieve. The moisture content of the sand shall not exceed 3% by weight.
- C. Asphalt materials shall be approved by the Engineer prior to use in the work. The Engineer may accept a certified analysis by the material supplier laboratory when a copy of the certified analysis accompanies each shipment of asphalt to the project. The Engineer reserves the right to perform tests of the asphalt received on the job.

2204.4 Construction

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

furnish all equipment, material and assistance necessary if calibration is required.

B. Preparation of Existing Surface

1. For tack coats: The existing surface shall be free of dust, loose material, grease or other foreign material at the time the tack is applied. Preparation of the surface is to be performed by the contractor before the tack is applied and is subsidiary to other items in the Contract.
2. For prime coats: the surface to be primed shall be shaped to the required grade and cross section, shall be free from ruts, corrugations, segregated material or other irregularities, and shall be uniformly compacted by rolling. The surface shall be firm and slightly damp when primer is applied. Delays in priming may necessitate reprocessing or reshaping to provide a smooth compacted surface.

C. Application of Asphalt Material

1. For Tack Coats: Asphalt emulsion shall be applied uniformly with a pressure distributor at the rate specified in the Contract, or as revised by the Engineer to be within a minimum of 0.05 and a maximum of 0.15 gallons per square yard. Water may be added to the asphalt emulsion and mixed therewith in such proportion that the resulting mixture will contain no more than 50% of added water, the quantity of added water to be approved by the Engineer. The application of the resulting mixture shall be such that the original emulsion will be spread at the specified rate. The asphalt emulsion shall be heated at the time of application to a temperature in accordance with the limits provided in Sec 2204.3, or as specified in the Contract Documents. The tack shall be properly cured and the tacked surface shall be cleaned of dirt and other foreign material before the next course is placed.

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

2. For Prime Coats: Bituminous material shall be applied to the width of the section to be primed by means of a pressure distributor in a uniform, continuous spread. The subgrade shall be moistened before the prime is applied. The application rate shall be as specified in the Contract Documents or as approved by the Engineer between 0.1 and 0.5 gallons per square yard. The primer shall be heated at the time of application to a temperature in accordance with the limits provided in Sec 2204.3, or as specified in the Contract Documents.

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

When traffic is maintained, not more than one half of the width of the section shall be treated in one application and one-way traffic will be permitted on the untreated portion of the roadbed. As soon as the bituminous material has been absorbed by the surface and will not pick up, traffic shall be routed to the treated portion and the remaining width of the section will be primed.

The primer shall be properly cured, and the primed surface shall be cleaned of dirt and surplus sand before the next course is placed.

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

SECTION 2205 ASPHALTIC CONCRETE SURFACE AND BASE

2205.1 Scope

This section governs the furnishing of all labor, materials and equipment for the construction of asphalt concrete base and/or asphalt concrete surface as shown on the Plans and in accordance with the Standard Drawings, the specifications and the Special Provisions.

2205.2 Referenced Standards

The following standards are referenced directly in this section. The latest version of these standards shall be used. If conflicting standards are referenced, the more stringent standard shall apply.

ASTM

- C 88 Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
- C 117 Test Method for Materials Finer than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing
- C 127 Test Method for Specific Gravity and Absorption of Coarse Aggregate
- C 128 Test Method for Specific Gravity and Absorption of Fine Aggregate
- C 131 Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- C 136 Test Method for Sieve Analysis of Fine and Coarse Aggregates
- C 142 Test Method for Clay Lumps and Friable Particles in Aggregates
- D 75 Practice for Sampling Aggregates
- D 140 Practice for Sampling Bituminous Materials
- D 979 Practice for Sampling Bituminous Paving Mixtures
- D 1188 Test Method for Bulk Specific Gravity and Density of Compacted Bituminous Mixtures Using Paraffin-Coated Specimens
- D 2041 Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures (comparable to AASHTO T209)
- D 2172 Test Methods for Quantitative Extraction of Bitumen From Bituminous Paving Mixtures
- D 2726 Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures
- D 2950 Test Method for Density of Bituminous Concrete in Place by Nuclear Methods
- D 3666 Specification for Minimum Requirements for Agencies Testing and Inspecting Bituminous Paving Materials
- D 4552 Practice for Classifying Hot-Mix Recycling Agents
- D 4791 Standard Test Method for Flat Particles, Elongated Particles, or Flat and Elongated Particles in Coarse Aggregate
- D 5444 Test Method for Mechanical Size Analysis of Extracted Aggregate
- D 6307 Test Method for Asphalt Content of Hot-Mix Asphalt by Ignition Method
- D 6373 Specification for Performance Graded Asphalt Binder

AASHTO

- T 166 Standard Method of Test for Bulk Specific Gravity (Gmb) of Compacted Hot Mix Asphalt (HMA) Using Saturated Surface-Dry Specimens
- T 245 Resistance to Plastic Flow of Bituminous Mixtures Using Marshall Apparatus
- T 269 Standard Method of Test for Percent Air Voids in Compacted Dense and Open Asphalt Mixtures (ASTM Designation: D 3203/D 3203M-11)
- T 283 Resistance of Compacted Bituminous Mixture to Moisture Induced Damage
- T 312 Standard Method of Test for Preparing and Determining the Density of Asphalt Mixture Specimens by Means of the Superpave Gyratory Compactor

Asphalt Institute

"Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types", MS-2, latest edition

National Institute of Standards and Technology

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

2205.3 Materials

No material shall be used until it has been approved by the Engineer. All costs associated with material testing, certification and the preparation of trial mixes to determine the job mix formula shall be the responsibility of the Contractor. Representative samples of all materials proposed for use under these specifications shall be submitted by the Contractor to a properly certified testing laboratory approved by the Owner, at the Contractor's expense, for testing and the preparation of trial mixes to determine the job-mix formula. Tests required by this specification for field verification of the mix shall be the responsibility of the Contractor at the Contractor's expense, unless specified otherwise. The Engineer reserves the right to perform additional testing to verify conformance with the requirements specified herein. These tests will be performed under the supervision of the Engineer without cost to the Contractor, unless specified otherwise in the Contract Documents.

- A. Asphalt: Asphalt cement used in the manufacture of asphalt paving mixtures shall conform to the Performance Graded system. The PG graded material used shall conform to the provincial grade used by the local DOT or as designated by the Engineer. In the Kansas City Metropolitan area, the provincial grade is a PG64-28 but PG 64-22 is commonly used so either is deemed acceptable.
- B. These general usage guidelines may not address all project conditions. The Engineer apply sound pavement design principles when designating mix type and selecting asphalt cement grade based upon individual project conditions. The Federal Highway Administration makes available LTPPBIND software that will assist with asphalt grade selection for specific projects.

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

The Contractor or asphalt supplier shall submit a temperature-viscosity chart showing the recommended mix and compaction temperatures for non-modified asphalts and shall provide the specific gravity of the asphalt.

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

Coarse Aggregate (Retained on the No. 4 Sieve)

LA Abrasion (ASTM C 131)	40% loss (maximum)
Soundness using Mag. Sulfate (ASTM C 88, 5 cycles)	18% loss (maximum)
Soundness using Sodium Sulfate (ASTM C 88, 5 cycles)	12% loss (maximum)
Total shale, clay, coal and lignite content (ASTM C 142)	1.0% by weight (max)

Fine Aggregate (Passing the No. 4 Sieve)

Organic content 1% maximum

The parent material of manufactured sand must also meet the requirements for coarse aggregate shown above.

Sampling shall be in accordance with ASTM D 75. Gradation analysis shall be in accordance with Standard Method of Test for Material Finer than No. 200 (75 um) Sieve in Mineral Aggregates by Washing, ASTM C 117 and Standard Method Test for Sieve Analysis of Fine and Coarse Aggregate, ASTM C 136. All aggregate quality tests must have been run within 12 months of the submission date of a mix design.

- D. Commercial Mix: Providing a commercial mix will only be permitted when specified in the Contract Documents or approved in writing by the Engineer. Contractor shall adhere to the most current State Department of Transportation standard specifications governing commercial mix asphalt for the state the work is being performed in. Example: for Kansas, Standard Specifications for State Road and Bridge Construction, 2015 Edition, Section 611.

2205.4 Mixing and Proportioning

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

	ASPHALTIC CONCRETE-TYPE					
	1-01	2-01	3-01	4-01	5-01	6-01
<u>Percent by Weight of Total Mixture</u>						
Asphalt Cement	4-6	4-7	4-7	5-7.5		
Aggregate - U.S. Standard						
<u>Square Sieve Size Total Percent Passing by Weight</u>						
1 ½" (37.5 mm)	100	--	--	--	--	--
1" (25.0 mm)	75-100	100	--	--	100	--
¾" (19.0 mm)	60-85	80-100	100	--	95-100	100
½" (12.5 mm)	--	--	85-100	100	--	86-100
3/8" (9.0 mm)	40-65	60-80	70-90	85-100	--	75-100
No. 4 (4.75 mm)	30-50	48-65	50-70	55-75	--	--
No. 8 (2.4 mm)	19-36	35-47	37-47	39-50	28 min	28 min
No. 16 (1.2 mm)	13-26	25-36	26-36	27-38	--	--
No. 30 (0.6 mm)	--	18-30	18-30	19-30	--	--
No. 50 (0.3 mm)	--	12-22	12-22	11-23	--	--
No. 100 (150 µm)	4-12	6-14	6-15	6-16	--	--
No. 200 (75 µm)	2-10	3-10	4-10	4-10	2-6	2-6

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

That fraction of material retained on the No. 4 (4.75-mm) Sieve shall be composed of particles with not less than 75% having two or more fractured faces for asphalt types 1-01, 2-01, 3-01, and 4-01, and not more than 20% by weight of that fraction shall be composed of flat or elongated particles based on a ratio of 5:1 when tested in accordance with ASTM D 4791. For Asphalt Types 5-01 and 6-01 only, the total aggregate (coarse aggregate, fine aggregate, and the material passing the No. 200 sieve (75µm) shall contain not less than 85% crushed material for intermediate course and surface course.

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

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

Permissible Gradation Variation from Mix Design Percent by Wt. of Total Mix:

<u>U.S. Standard Sieve Size</u>	<u>Type 1-01, 5-01, 6-01</u>	<u>Type 2-01, 3-01, 4-01</u>
No. 4 and larger	5.0	4.0
No. 8, 16, 30, 50	4.0	3.0
No. 200	2.0	1.0

Permissible Oil Content Variation from Mix Design:

Type 1-01, 5-01, 6-01 – 0.5%

Type 2-01, 3-01, 4-01 – 0.3%

B. Asphalt Mix General Usage:

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

Generally, mix types 1-01, 2-01, 3-01 and 4-01 are composed of local materials and are appropriate for general use other than roadways. Unless specified otherwise in the Contract, Plans or Special Provisions, only mixes 5-01 and 6-01 should be used for roadways. The Contractor may submit a written request to use mix 1-01 for pavement base or mix 3-01 for pavement surface.

Mix type 2-01 is acceptable for surfacing, but is generally more open-graded than the other surface mixes, and may not provide a tightly sealed surface.

Mix type 4-01 is very susceptible to rutting and is only recommended for non-vehicular use.

C. Asphalt Hot-Mix Recycling

- General: Except as modified herein, Recycled Asphaltic Concrete (RAC) shall be equal to that produced as new material. Reclaimed Asphalt Pavement (RAP), Fractionated Reclaimed Asphalt Pavement (FRAP) and/or Reclaimed Aggregate Materials (RAM) shall represent no more than 30% of the composition for all surface mixtures and no more than 40% of the composition for all base mixtures. However, for base mixtures using FRAP, the composition may be no more than 50%.

Recycled Asphaltic Concrete may contain combinations of FRAP, RAP, RAM, coarse aggregate, fine aggregate, mineral filler, asphalt cement, recycling agent, anti-stripping agent and approved additives to produce an acceptable mixture. Recycled Asphalt Shingles (RAS) are not allowed. Recycled Asphaltic Concretes shall be designated by prefacing the type with "RC," such as "RC Type 1-01".

- FRAP is defined as having two or more stockpiles, where RAP is processed into coarse and fine fractions. The fine FRAP stockpile will contain only material passing the ¼ inch screen. The coarse FRAP stockpile will contain milled material retained on the ¼ inch screen and passing the ¾ inch screen. FRAP may be comprised of coarse or fine FRAP or a combination thereof. Utilize a separate cold feed bin for each stockpile of FRAP used. Do not blend coarse and fine FRAP either in the stockpile or in a cold feed bin. Add FRAP to the mix through the RAP collar. Sources and types FRAP must be recorded and submitted to the Engineer upon request. The FRAP used in production shall be similar in composition (extracted gradation and asphalt content) to the source used for design.
- Materials Evaluation: All recycled materials shall have the following tests performed in addition to those required in Section 2205.4.D:

- a. A sieve analysis shall be performed on FRAP, RAP and/or RAM in accordance with ASTM C 117, "Standard Test Method for Material Finer than No. 200 Sieve (75 μ m) in Mineral Aggregates by Washing" and ASTM C 136, "Standard Method for Sieve Analysis of Fine and Coarse Aggregates" after extraction of asphalt.
- b. Asphalt content analysis shall be performed for FRAP or RAP in accordance with Method "A" of ASTM D 2172, "Standard Test Methods for Quantitative Extraction of Bitumen from Bituminous Paving Mixtures" where the FRAP or RAP content exceeds 30%. For mixtures with FRAP or RAP contents less than 30%, asphalt content may be determined using ASTM D 6307.
- c. The asphalt cement used shall be determined as follows:
 - i. For FRAP or RAP contents of up to 20%, the asphalt grade shall be as specified in the mix design.
 - ii. For FRAP or RAP contents from 20% up to 30%, the asphalt grade shall be decreased one temperature range. For example, a design PG 64-22 would be decreased to a PG 58-28.
 - iii. For FRAP or RAP contents from 30% to 50%, the asphalt grade of the new asphalt shall be determined using the procedures outlined in MS-2, latest edition, Appendix A. This would likely result in a PG 52-34.
- d. All sources of material for use in RAC must be approved by the Engineer prior to use.

4. Material Requirements

- a. New asphalt cements added to the aged asphalt shall meet the requirements of Section 2205.3.
- b. Recycling Agents, if used, shall meet the requirements of ASTM D 4552, "Standard Practice for Classifying Hot Mix Recycling Agents".
- c. The FRAP, RAP and/or RAM stockpiled at the plant site shall be maintained in stockpiles separated into surface and base. The RAP and/or RAM shall be processed such that 100% will pass the 1-1/2 inch (38 mm) sieve and 90% will pass the 1-inch (25.4 mm) sieve.
- d. The final product shall be free of foreign matter (e.g., old planer teeth, ice, wood, soil, broken sewer castings, loop detector wire, protective membranes, rubberized joint filler materials and foil turn lane markers, trash, debris, etc.).

5. Mix Design Requirements: The necessary steps for a final mix design for recycled mixtures shall be done in accordance with the Asphalt Institute's Manual MS-2 latest edition in the appendix entitled "Mix Design Using RAP". If there is a change in the RAP and/or RAM percentage from the original amount of RAP and/or RAM in the mix design, a new mix design must be submitted.

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

D. Mix Design Criteria: Laboratory Test Specimen(s) of mixes 1-01, 2-01, 3-01 and 4-01, combined in proportions of the job-mix formula, shall be prepared and tested in accordance with AASHTO T 245 and the volumetric properties of the compacted paving mixtures as calculated by ASTM procedures using Chapter 4 of the Mix Design Methods for Asphalt Concrete and other Hot-Mix Types (MS-2), latest edition, Asphalt Institute referred hereafter as "MS-2". The Marshall procedure shall be as specified in Chapter 5 of the MS-2.

For mixes 5-01 and 6-01, the procedures outlined in Asphalt Institute's "Mix Design Methods for Asphalt Concrete and Other Hot-Mix Types (MS-2)", latest edition, must be used to prepare the asphalt samples for design and quality control testing. The gyratory values for the SuperGyratory Compactor (SGC) to be used for this purpose are $N_{\text{initial}} = 6$, $N_{\text{design}} = 50$, and $N_{\text{max}} = 75$. At N_{initial} , the specific gravity of the specimen must be

90.5% or less of G_{mm} , at N_{max} the specific gravity of the specimen must be 98.0% or less of G_{mm} . The Voids in the Mineral Aggregate (VMA) shall be as specified in Chapter 5 of the MS-2.

The material for the theoretical specific gravity (G_{mm} per ASTM D 2041) and the material for the Marshall specimens and Super Gyrotory Compactor specimens (pucks) shall be cured at 285 $\pm$ 5°F for four hours in a closed oven after the mix is produced in the laboratory. Also, the plant produced mixture shall be tested when the mix is four hours old when preparing a mix design but may be tested when at least two hours old for production testing. The mixture shall be transported to the laboratory in an insulated container and then stored in a laboratory oven at 285 $\pm$ 5°F for the remainder of the curing period. This procedure shall be used when the water-absorption as determined by ASTM C 127 and ASTM C 128 of any aggregate in the mixture exceeds 1.25%. The mixture shall be compacted at 285 $\pm$ 5°F. If total mix aggregate absorption exceeds 2.0%, the laboratory may use the G_{mm} dryback option within the test method.

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

Marshall Stability: 1500 lbs. (6672 N) minimum (Types 1-01, 2-01, 3-01, and 4-01)

No. of compaction blows: 50 (Types 1-01, 2-01, 3-01, and 4-01)

Flow: 0.08-0.16 inches maximum (Types 1-01, 2-01, 3-01, and 4-01)

Air Voids:	Percent
Base & Surface (Types 5-01 & 6-01)	3-5
Base & Surface (Types 1-01, 2-01, 3-01, and 4-01)	2-5

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

Voids in Mineral Aggregate (VMA) for Types 5-01 & 6-01 (Nominal Max Size as defined in MS-2)	Percent (min.)
3/4" (19 mm)	13
1/2" (12.5 mm)	14
3/8" (9.5 mm)	15

The VMA for Mix Types 5-01 & 6-01 shall be the minimum value allowed. For these mixes, the asphalt content should be just to the left side of the low point on the VMA vs. Asphalt Percent curve, not to the "wet" or right (increasing) side of the curve. Nominal maximum sized as defined in MS-2 means the sieve size where the next smaller sieve size (from Table in Section 2205.4.A) retains at least 10% of the sample.

The VMA requirements shown represent values that may be higher than those obtained in the KC Metropolitan area using locally available materials. The minimum values are values recommended by the Asphalt Institute in MS-2, latest edition, for high quality asphaltic concretes, but may require the use of non-local aggregates. VMA values shown are for 4% air voids and should be used for the design of conventional roadway pavements.

During production, the air voids can be expected to vary plus or minus 1% of the design value of 4%. For Mix Types 1-01, 2-01, 3-01, and 4-01, 3% - 4% air voids may be used for design and production may be allowed to vary plus or minus 1% of the design value.

The ratio of minus 200 (75 μ m) material to % Effective asphalt cement (P_{eff}) based on the weight of the aggregate shall be between 0.6-1.4 for Mix Types 5-01 and 6-01.

The blend of FRAP, RAP and/or RAM and virgin aggregates or non-recycled asphalts shall be checked for resistance to stripping using AASHTO T 283 to determine if an anti-stripping agent is needed. The index of

retained strength shall exceed 75% for Mix Types 1-01, 2-01, 3-01, and 4-01, and 80% for Mix Types 5-01 and 6-01.

- E. Sampling and Testing of the Mixture: All Mix Types shall be sampled in accordance with ASTM D 979 and tested in accordance with AASHTO T 245, ASTM C 136, ASTM C 117, AASHTO T 312, AASHTO T 269, AASHTO T 166, AASHTO T 283, ASTM D 2041, ASTM D 2726, ASTM D 1188, ASTM D 2950, ASTM C 127 and ASTM C 128, as specified herein. The mixtures will be tested for binder content in accordance with ASTM D 2172 or D 6307. The recovered aggregate will be sieved in accordance with ASTM D 5444.
- F. Mixture Temperature Requirements: The temperature of the completed mix at the plant and at the paver shall be set by the Contractor/Producer who shall consider hauling and placing conditions, asphalt specifications as set forth in Section 2205.3, and weather limitations set forth in Section 2205.9.B. The temperature of Mix Types 5-01 and 6-01 shall not exceed 315° F at the point of discharge from the asphalt plant.

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

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

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

- I. Preparation and Handling of Aggregate: Coarse and fine aggregate shall be stored at the plant in such a manner that the separate sizes will not become intermixed. Cold aggregates shall be carefully fed to the plant in such proportions that surpluses and shortages in the bins will not cause breaks in the continuous operation. When loading aggregate into stockpiles, and into cars, barges, and trucks, the material shall be placed in such a manner as to prevent segregation of aggregate sizes. Stockpiles shall be built in uniform layers not exceeding 5 feet in depth.
 - 1. Samples of coarse and fine aggregate shall be submitted to the Engineer for testing upon request. The Contractor/Producer shall be responsible for the preparation and handling of aggregates to insure that the cold-feed gradations fall within the mix design limits. Cold-feed gradation tests shall be taken as requested by the Engineer.
 - 2. Drying: The aggregate shall be thoroughly dried and heated to provide a paving mix temperature within a tolerance of + or - 25° F of that specified by the approved mix design. The moisture content of the heated and dried aggregate shall not exceed 0.5%. The quantity of material fed through the dryer shall in all cases be held to an amount which can be thoroughly dried and heated.
- J. Inspection and Control of Asphalt Mixing Plant
 - 1. Tests: During production the plant shall have the specified tests performed by an approved laboratory. These may include: asphalt (binder) content, aggregate gradation after removal of asphalt, density,

stability, % voids, VMA, VFA, theoretical specific gravity, bulk specific gravity, maximum theoretical density, maximum theoretical specific gravity, tensile strength ratio, etc. Properties of the plant produced mix shall be determined using uncompacted mix sampled behind the paver. Laboratories shall be approved if they are:

- a. Accredited in accordance with ASTM D3666; and/or
 - b. Approved for Superpave asphalt testing by the State Highway Department in the state where the plant is located.
 - i. The individual performing the test must carry a state certification for Superpave testing.
 - ii. The laboratory must have an annual certification by an independent testing agency of all testing equipment used for Superpave mix designs, and must also have the Marshall hammer weight and height of drop certified by that same agency.
2. Availability of test reports: The results of the latest current test report shall be furnished to the Engineer upon request. All test reports shall be kept at the plant, and shall be made available upon request. If the mix is found to be outside of tolerance, or outside the specification limits as specified in Section 2205.4, correction shall be made. Test reports shall be furnished on the appropriate attached "Asphalt Concrete Test" form or a similar form containing equivalent information.
3. Frequency of testing for mixes 1-01 through 4-01: the tests listed in paragraph 1 shall be performed a minimum of once for every 3000 tons of asphalt production (minimum of once per day when the plant has produced at least 200 tons and at discretion of Engineer if less than 200 tons produced) except during initial startup, or whenever the production asphalt fails one of the following conditions at which time they will be tested every 1000 tons until 4 consecutive tests show compliance with the specifications:
- a. Production void content measured at the plant discharge is less than 2% or more than 5%.
 - b. Extracted gradation of the production asphalt exceeds the permissible gradation variation for the mix type being produced.
 - c. Asphalt cement exceeds the content variation for the mix type being produced.
4. Frequency of testing for mixes 5-01 and 6-01: the tests listed in paragraph 1 shall be performed once per day of production, or every 1000 tons, whichever is less frequent except during initial startup (if less than 200 tons produced testing is at discretion of Engineer); or whenever the production fails one of the following conditions at which time they will be tested every 500 tons, or twice per day of production, whichever is less frequent until 4 consecutive tests show compliance with the specifications:
- a. Production void content measured at the plant discharge is less than 3% or more than 5%.
 - b. Extracted gradation of the production asphalt exceeds the permissible gradation variation for the mix type being produced.
 - c. Production VMA measured at the plant discharge is below the design minimum VMA.
 - d. Production VFA measured at the plant discharge is outside the allowable range.
 - e. Production dust to binder ratio is outside the allowable range.
5. Redesign of Asphalt mixes: If four consecutive tests performed as described in paragraph 3 or 4 above show noncompliance with the specifications as enumerated in the subparagraphs of paragraph 3 or 4 above, production of that type of asphalt will immediately cease, and may not be resumed until a new mix design is submitted and approved, or the plant can demonstrate to the Engineer an ability to meet specifications. Resumption of asphalt production after a mix redesign or failure of four consecutive tests to meet specifications will be treated as an initial startup for testing purposes.

MARSHALL ASPHALTIC CONCRETE TEST (Verified Mix Design)
(Types 1-01, 2-01, 3-01, 4-01)

Description:			
Pavement Type:			
LAB ID:	LOT		
Sample Date:	Belt		Tons
Sample ID:	Hot Mix		Tons
Supplier:			

Sieve Size	Belt Sample	Hot-Mix Sample*	Single Point Job-Mix Formula	Job-Mix Formula Tolerances	ASTM C 136, C 117, D 5444 *Uncompacted Behind Paver **total mix basis ***total aggregate
1" (25 mm)					
3/4" (19 mm)					
1/2" (12.5 mm)					
3/8" (9.5 mm)					
No. 4 (4.75 mm)					
No. 8 (2.36 mm)					
No. 16 (1.18 mm)					
No. 30 (600 um)					
No. 50 (300 um)					
No. 100 (150 um)					
No. 200 (75 um)					

EXTRACTION DATA - ASTM D6307 or D 2172	FRAP	Sample	Plant Setting	Recycled AC%
%AC**				
%AC**				

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

MARSHALL CHARACTERISTICS (ACCEPTANCE CRITERIA)			
Compaction Blows (average of 3 specimens) = 50			
	Sample*	Specifications*	
Stability, lbs (kg)		Min	AASHTO T 245
Flow, 1/100 in (mm)		Max	AASHTO T 245
% Voids		3-5	
% VFA			
Density, pcf (kg/cu.m)		-----	ASTM D 2950, D 2726, or D 1188
Max Theoretical Specific Gravity G_{mm}		-----	ASTM D 2041
Bulk Spec. Gr. of total Agg. G_{sb}		-----	ASTM C 127 & C 128
COMMENTS:			

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

SUPERPAVE ASPHALTIC CONCRETE TEST (Verified Mix Design)
(Types 5-01, 6-01)

Description:			
Pavement Type:			
LAB ID:		TIME	TONS
Sample Date:	Belt		
Sample ID:	Hot Mix		
Supplier:			

Sieve Size	Belt Sample	FRAP/RAP Sample*	Hot-Mix Sample*	Master Grade Limits	Cal. Single Point	ASTM C 136, C 117, D 5444 *Uncompacted Behind Paver **total mix basis ***total aggregate
1" (25 mm)						
3/4" (19 mm)						
1/2" (12.5 mm)						
3/8" (9.5 mm)						
No. 4 (4.75 mm)						
No. 8 (2.36 mm)						
No. 16 (1.18 mm)						
No. 30 (600 um)						
No. 50 (300 um)						
No. 100 (150 um)						
No. 200 (75 um)						

EXTRACTION DATA - ASTM D6307 or D 2172	FRAP	Sample	Plant Setting	Recycled AC%
%AC**				
%AC**				

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

VOLUMETRIC DATA 6" NOMINAL SIZE Gyratory Specimens			
Gyrations (avg. of 2 specimens) @ 280-290 deg F – AASHTO T312			
Ndes = 50 Nini = 6 Nmax = 75			
	Sample*	Specifications*	
Mix bulk specific gravity @ Ndes, Gmb		---	
% Voids @ Ndes		3.0-5.0	AASHTO T 269
% VMA @Ndes, Gsb basis			
% VFA @ Ndes		9.0–11.0	=%VMA-%Voids
% Gmm @ Nini		85-91	AASHTO T 166
Ratio (-) 75 um (No. 200) to % Eff. Binder		0.6-1.4	
Tensile Strength Ratio, %		80 minimum	AASHTO T 283
Max Theoretical Specific Gravity Gmm		-----	ASTM D 2041
Max Theoretical Density, pcf		-----	
Effective Specific Gravity Agg., Gse		-----	
Bulk Specific Gravity of Total Agg., Gsb		-----	ASTM C 127 & C 128
Specific Gravity of Asphalt, Gb		-----	
COMMENTS:			

2205.5 Asphalt Mixing Plant

Plants used by the Contractor for preparation of the asphalt paving mix shall conform to the following requirements:

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

The Contractor shall also furnish necessary laboratory sieves and a powered shaker device for sieve analysis, scales, ignition oven and supplementary equipment to make aggregate sieve analysis, asphaltic concrete paving mixture analysis, and paving mixture density tests. This equipment shall be in good working condition and properly calibrated.

- B. The asphalt producer shall establish a quality control plan and shall maintain records. The quality control plan required by the state highway agency is a suggested standard. Upon request by the Engineer, the quality control plan shall be submitted for review and approval.

2205.6 Transportation of Mix

The mix shall be transported to the job site in vehicles with tight metal bottoms, clean of all foreign material which may affect the mix. If a release agent is used, it must comply with State and Federal environmental regulations.

The dispatching of the vehicles shall be so scheduled that all materials delivered may be placed in daylight unless the Engineer approves artificial light. Delivery of the material to the paver shall be at a uniform rate and in an amount within the capacity of the paving and compacting equipment.

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

2205.7 Scales and Weighing of Vehicles

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

- A. Measurement by weight: Measurement will be made by weighing each truck load on scales conforming to the requirements of Section 2205.7.B "Vehicle Scales".
- B. Vehicle Scales: Vehicle scales shall be approved by the Engineer and shall conform to the requirements specified herein. The specifications, tolerances, and other technical requirements for weighing and measuring devices as recommended by the National Conference on Weights and Measures and published in the National Institute of Standards and Technology Handbook 44, Specifications, Tolerances, and Other Technical Requirements for Weighing and Measuring Devices, and supplements thereto or revisions thereof, shall apply to all vehicles scales used.
- C. Scale acceptance shall be based on one of the following:
 - 1. A valid certification or seal of approval by the Division of Weights and Measures from the state.

2. A certification of calibration from a commercial scale service company showing that the scale meets the requirements of these specifications. The Contractor shall furnish the certification of calibration to the Engineer.
- D. Scale Calibration: Scales shall have been calibrated within the nine month period prior to any material being delivered, or at any time the Engineer has cause to question the accuracy of the scale. Scales shall meet the requirements of Accuracy Class III L as defined in Handbook 44 (above).

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

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

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

2205.8 Asphalt Paving Equipment

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

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

Pavers shall be in good working condition, equipped with quick and efficient steering devices and shall be capable of traveling both forward and in reverse. They shall be equipped with hoppers and distributing screws that place the mix evenly in front of the adjustable screeds. They shall be equipped with either a vibrating screed or a tamping bar immediately preceding a static screed. There shall be sufficient auxiliary attachments for the paving machine so that it may be operated to lay the necessary width as determined in the field by the Engineer. Vibrating screed or tamp bars shall be provided for the full width of all paving operations.

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

1. Automatic Screed Controls: The paver shall be equipped with and use an approved system capable of automatically controlling the elevation and transverse slope of the paver screed unless otherwise directed by the Engineer. An erected stringline, traveling stringline or other approved device operating on the roadbed being paved or the surface of the previously placed lane shall be used to establish the grade reference. The grade reference device shall operate on either or both sides of the paver as required and shall be capable of maintaining the desired transverse slope regardless of changes in the screed elevation.

2. The traveling stringline shall be constructed in such a manner that it does not vibrate or cause the sensor to make erroneous readings during the laydown operation. The length of the beam to be used shall be approved by the Engineer and shall be between 20 feet and 40 feet.
 3. The use of the automatic screed control devices on asphalt pavers will not be required for paving small irregular areas, entrances, approaches, or side street connections.
 4. Automatic screed control devices will be required for matching the joint with all previously laid strips, except for those areas noted above.
- B. Rollers: Compaction equipment shall consist of vibratory steel wheel, static steel wheel and pneumatic-tired rollers unless otherwise directed by the Engineer. They shall be self-propelled and equipped with such controls that starting, stopping and reversing direction can be accomplished without displacing the hot asphaltic concrete pavement.

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

1. Steel-Wheeled Rollers: Steel-Wheeled Rollers shall be self-propelled, vibratory two-axle tandem rollers. These rollers shall develop contact pressure of 250 to 350 pounds per inch of width (vibratory mode) or 150 to 180 pounds per inch of width (static). Rollers shall be in good working condition.
 2. Pneumatic-Tired Rollers: Heavy pneumatic-tired rollers shall be self-propelled and shall consist of two axles on which are mounted an odd number of pneumatic-tired wheels. The roller shall have at least nine pneumatic-tired wheels mounted in such a manner that the rear group of wheels will not follow in the tracks of the forward group, but shall be spaced to give essentially uniform coverage with each pass. Axles shall be mounted in a rigid frame provided with a loading platform or body suitable for ballast loading. Tires shall be smooth, inflated to 90 psi. Construction of the roller shall be such that each wheel is loaded to a minimum of 2,300 pounds.
 3. In lieu of the above requirements, consideration will be given to use other types of equipment that are capable of producing equivalent results consistent with the requirements of the specifications. Any roller not meeting the requirements of paragraphs 1 and 2 above must be approved by the Engineer prior to use.
- C. Pressure Distributor: The pressure distributor shall meet the requirements of Section 2204.4.A entitled "Pressure Distributor".
- D. Hand Tools: The Contractor shall provide sufficient lutes, rakes, shovels, and other equipment as required to produce results consistent with the specifications.

2205.9 Construction

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

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

When leveling course is not required, depressions and other irregularities shall be patched or corrected, and the

work approved by the Engineer before the paving operation begins.

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

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

- B. Weather Limitations: When the moisture of the aggregate in the stockpile or from the dryer interferes with the quality of mix production, or with normal plant operations, the mixing and placing of hot-mix asphalt will not be permitted without the permission of the Engineer. No mixture shall be placed on wet or frozen surface.

Hot Mix asphalt paving shall not be mixed or placed when the ambient air or base temperature is below the temperatures shown in the following table, or when there is frost in the subgrade or any other time when weather conditions are unsuitable for the type of material being placed without expressed approval of the Engineer.

<u>Paving Course</u>	<u>Thickness (inches)</u>	<u>Air Temperature (Degrees F)</u>	<u>Road Surface Temperature (Degrees F)</u>
Surface	All	50	55
Base	Less than 3	40	45
Base	3 or more	30	35

All bituminous mixtures shall be delivered to the paver at a temperature sufficient to allow the material to be placed and compacted to the specified density and surface tolerance. Minimum allowable temperature for the asphalt mix to be placed into the paver is 235° F. Regardless of the temperature, final acceptance of the asphalt mat shall be based on density determined in accordance with Section 2205.9.E.

- C. Spreading and Finishing: The spreading and finishing of each course shall be to the thickness, cross slope, and width indicated on the Plans or Special Provisions. The thickness of individual layers shall not exceed the following for the respective type of mixture. The suggested minimum lift thickness shall be three times the nominal maximum size of the mix. Nominal maximum is defined as the first sieve size larger than the sieve which retains at least 10% of the aggregate by weight.

<u>Asphalt Type</u>	<u>Max. Compacted Lift Thickness</u>
Type 1-01	4"
Type 2-01	4"
Type 3-01	3"
Type 4-01	2"
Type 5-01	4"
Type 6-01	3"

Spreading and finishing shall be conducted in the following manner:

1. Mechanical Pavers: The base and surface courses shall be spread and struck-off with a mechanical paving machine meeting the requirements of Section 2205.8.A entitled "Pavers and Laydown Machines". The paving machine shall be operated so that the material does not accumulate and remain along the sides of the receiving hopper. The wings of the spreader hopper shall not be emptied (flipped) between truck loads.
 - a. Equipment which leaves tracks or indented areas which cannot be corrected in normal operation, or which produces other permanent blemishes or fails to produce a satisfactory

- surface, shall not be used.
- b. The screed auger shall be operated approximately 3/4 full and the hopper conveyor shall not be allowed to run out of material during the paving operation. Sufficient trucks shall be used to continuously supply asphalt to the paver. Delays in the paving operation shall be kept to a minimum.
 - c. When using pavers in echelon, the second paver shall follow the edge of the material placed by the first paver. The length of each laydown pass shall be limited, depending on weather conditions, to assure a hot joint and obtain proper compaction.
2. Longitudinal joints and edges shall be constructed to true lines. Lines for the paver to follow in placing individual lanes will be established parallel to the centerline of the proposed roadway. The paver shall be positioned; and operated to follow closely the established line. Offset the longitudinal joint in successive courses by 6 to 12 inches. Longitudinal joints in the final surface layer shall be at the lane lines of the traveled way, but shall be offset to prevent lane separation pavement markings from falling on the joint. Any irregularities in alignment left by the paver shall be corrected directly behind the paver, prior to compaction. Distortion of the pavement during this operation shall be avoided. Edges against which additional pavement is to be placed shall be placed on a 30° (2:1) bevel, or as specified by the Engineer.
 3. Transverse joints in succeeding courses shall be offset at least 2 feet.
 4. The Contractor shall make every effort to minimize the number of passes heavy equipment makes over uncompleted roadway sections. The Contractor shall schedule and route his hauling operation to minimize hauling over a final course as much as feasible.
 5. As soon as the first load of material has been spread, the texture of the unrolled surface shall be checked to determine its uniformity. Segregation of materials shall not be permitted. If segregation occurs, the spreading operation shall be immediately suspended until the cause is determined and corrected by the Contractor.
 6. Any irregularities in the surface of the pavement course shall be corrected directly behind the paver. Excess material forming high spots shall be removed by a shovel or lute. Indented areas shall be filled with hot mix and smoothed. Broadcasting of material shall not be permitted.
 7. Hand Spreading: In small areas where the use of mechanical finishing equipment is not practical, the mix may be spread and finished by hand. The material shall be distributed uniformly to avoid segregation of the coarse and fine aggregate. Broadcasting of material shall not be permitted. During the spreading operation, all material shall be thoroughly and uniformly distributed by lutes or rakes. Material that has formed into lumps and does not break down readily shall be removed. Following placing and before rolling, the surface shall be checked with templates and straightedges and all irregularities corrected.

D. Compaction

1. General: The Contractor is responsible for development of a compaction procedure that will obtain the required density. A minimum of three rollers shall be used for compacting mixes on roadways (2 steel drum and 1 pneumatic tire) unless otherwise approved by the Engineer. For uses other than roadways, a minimum of two rollers shall be used unless otherwise approved by the Engineer. Rollers shall meet the requirements of Section 2205.8.B entitled "Rollers".

Immediately after spreading, each course of the pavement mixture shall be uniformly compacted by rolling. The initial or "breakdown" rolling shall be accomplished with a steel-wheeled vibratory roller and shall take place as closely behind the laydown machine as the temperature and condition of the

mat will allow. The pneumatic-tired roller shall be used to knead and compact the pavement mixture following the initial rolling and preceding the final rolling. Care shall be exercised in the use of the pneumatic-tired roller to ensure that the pavement mixture is sufficiently cooled to avoid "picking up" of the mixture on the tires of the roller, and also to ensure that the pneumatic-tired rolling is completed before the mixture becomes too cool to allow satisfactory finish rolling. Final, or finish rolling, shall be done with a steel-wheeled roller in static mode. The sequence of rolling operations may be changed with the approval of the Engineer. Rolling shall be longitudinal, starting near the low or unconfined edge of the pavement, then to the other edge and finally progressing towards the center. Alternate trips of the roller shall be of slightly different lengths.

The motion of the roller shall be slow enough at all times to avoid displacement of the hot mixture (generally 3mph). Any displacement occurring as a result of reversing the direction of the roller, or from any other cause, shall be corrected immediately by the use of rakes and fresh mixture when required. To prevent adhesion of the mixture to the roller, the wheels shall be kept properly moistened, but excess water will not be permitted.

The surface of the mixture after compaction shall be smooth and true to established section and grade. Any surface which is segregated, or is in any way defective, shall be removed and replaced with fresh hot mixture at the Contractor's expense, and shall be immediately compacted to conform to the surrounding area.

2. Rolling Procedure: The Contractor is responsible for determining an acceptable rolling procedure that will provide a product that is uniformly compacted to the required density and true to line and grade. There are many possible variations that may accomplish this but the general order for rolling is:
 - a. Transverse joint
 - b. Longitudinal joint (if in echelon)
 - c. Unconfined or low side edge
 - d. Other edge
 - e. Middle
 - f. Intermediate rolling; same procedure as breakdown rolling but pneumatic roller should stay the thickness of the lift from the free edge
 - g. Finish rolling

When paving in echelon, 2-3 inches of the first mat shall be left unrolled, and rolled when the joint between the lanes is rolled, after the 2nd mat is placed. Edges shall not be exposed more than fifteen minutes without being rolled. Particular attention shall be given to the construction of transverse and longitudinal joints in all courses.

In laying a surface mix adjacent to any finished area, it shall be placed sufficiently high so that, when compacted, the finished surface will be true and uniform. Where the grade is slight a level will be used to insure drainage to the desired outlet.

3. Transverse joints: The Contractor shall use a method of making a transverse construction joint that provides a thorough and continuous bond with acceptable surface texture and meeting the density requirements. The surface elevation should not vary more than 3/16" in 10' when tested across the joint. If the joint has been distorted, it shall be trimmed to a line. The joint face shall be tacked before the fresh material is placed against it.
4. Longitudinal joints: When paving against existing asphalt pavement, the edge to be joined shall be tack coated. The paver screed shall be set to overlap the first mat by 1-2 inches. The elevation of the screed above the surface of the first mat should be equal to the amount of roll-down expected during

compaction of the new mat. For large aggregate mixes, the coarse aggregate in the material overlapping the cold joint should be carefully removed and wasted, leaving only the finer portion of the mixture. The overlapping material should be pushed with a lute or rake onto the side of the joint where the new pavement is located prior to compaction.

When paving against existing concrete pavement, curb and gutter or other structure, the edge to be joined shall be tack coated. The elevation of the screed above the surface of the first mat should be equal to the amount of roll-down expected during compaction of the new mat. Where drainage of stormwater will flow from the new mat onto abutting curb and gutter, add an additional $\frac{1}{8}$ " - $\frac{1}{4}$ " of thickness to the new mat.

5. Breakdown Rolling: Steel wheel rollers as specified in Section 2205.8.B entitled "Rollers" shall be used for breakdown rolling. Breakdown rolling shall be performed as close behind the paver as necessary to obtain adequate density without causing undue displacement. The breakdown roller shall be operated with the drive wheel nearest the laydown machine. Exceptions may be made by the Engineer when working on steep slopes or super-elevated curves. Breakdown rolling sequencing is to be determined by the Contractor and approved by the Engineer.
 6. Intermediate Rolling: Pneumatic-tired rollers as specified in Section 2205.8.B entitled "Rollers" shall be used for intermediate rolling unless otherwise approved by the Engineer. The intermediate rolling shall follow the breakdown rolling as closely as possible and while the paving mix is still of a temperature that will result in maximum density from this operation. Pneumatic-tired rolling shall be continuous after the initial rolling until all of the mix placed has been compacted to the required density. Turning of pneumatic-tired rollers on the hot paving mix which causes displacement shall not be permitted.
 7. Finish Rolling: The finish rolling shall be accomplished before the material falls below a temperature of 175° F to allow for the removal of roller marks. All roller marks shall be removed by the finish rolling operation. All rolling operations shall be conducted in close sequence.
 8. In places inaccessible for the operation of standard rollers as specified, compaction shall be performed by other means meeting the requirements of Section 2205.8.B entitled "Rollers." The Contractor shall ensure that the material is thoroughly compacted to the satisfaction of the Engineer. If approved by the Engineer, hand tamping, manual or mechanical, may be used in such areas, if the required density is met.
- E. Density and Surface Requirements: The completed asphalt concrete paving shall have a density equal to or greater than 95% for Types 1-01 and 5-01 Asphalt Concrete Base and 96% for Types 2-01, 3-01, 4-01, 5-01, and 6-01 Asphalt Concrete Surface. Density is based on the density of laboratory specimens from plant produced mix prepared as specified in Section 2205.4.D entitled "Mix Design Criteria" and made from a sample representing the material being tested. Density testing shall conform to ASTM D 2950, ASTM D 2726, or ASTM D 1188.

If cores are used to determine density, one or more tests (one test equals three cores) will be taken for each tonnage lot and averaged to determine acceptance. The cores will be taken from random locations within the lane being paved, a minimum of 1' from any joint or edge. The Engineer will mark the locations of all cores.

All unsatisfactory work shall be repaired, replaced or corrected. The surface of the final course shall be of a uniform texture and conform to line and grade shown on the Plans. Allowable tolerance for the final surface of roadway pavement shall conform to the requirements of Section 2211 entitled "Smoothness". Tests for Plan grade conformance and surface smoothness shall be performed by the Contractor in the presence of the Engineer. Tests shall be performed at intervals as directed by the Engineer.

SECTION 2206 ASPHALT CRACK SEALING, ASPHALT CRACK FILLING, CHIP SEALING, SLURRY SEALING, AND MICRO-SURFACING

2206.1 Scope

This section governs the furnishing of all labor, materials and equipment for the performance of asphalt crack sealing, asphalt crack filling, chip sealing, slurry sealing and micro-surfacing as shown on the Plans and in accordance with the Standard Drawings, the specifications and the Special Provisions.

2206.2 Referenced Standards

The following standards are referenced directly in this section. The latest version of these standards shall be used. If conflicting standards are referenced, the more stringent standard shall apply.

ASTM

- C 88 Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
- C 117 Test Method for Materials Finer than 75- μ m (No. 200) Sieve in Mineral Aggregates by Washing
- C 131 Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
- C 136 Test Method for Sieve Analysis of Fine and Coarse Aggregates
- C 142 Test Method for Clay Lumps and Friable Particles in Aggregates
- D 36 Standard Test Method for Softening Point of Bitumen (Ring-and-Ball Apparatus)
- D 140 Practice for Sampling Bituminous Materials
- D 242 Standard Specification for Mineral Filler For Bituminous Paving Mixtures
- D 244 Standard Test Methods for Emulsified Asphalts
- D 946 Standard Specification for Penetration-Graded Asphalt Cement for Use in Pavement Construction
- D 977 Standard Specification for Emulsified Asphalt
- D 1073 Standard Specification for Fine Aggregate for Bituminous Paving Mixtures
- D 2027 Standard Specification for Cutback Asphalt (Medium-Curing Type)
- D 2028 Standard Specification for Cutback Asphalt (Rapid-Curing Type)
- D 2397 Standard Specification for Cationic Emulsified Asphalt
- D 2419 Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate
- D 3381 Standard Specification for Viscosity-Graded Asphalt Cement for Use in Pavement Construction
- D 3910 Standard Practices for Design, Testing, and Construction of Slurry Seal
- D 5078 Standard Specification for Crack Filler, Hot-Applied, for Asphalt Concrete and Portland Cement Concrete Pavements
- D 6372 Standard Practice for Design, Testing, and Construction of Micro-Surfacing
- D 6690 Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements

AASHTO

- T 53 Softening Point of Bitumen (Ring-and-Ball Apparatus)
- T 59 Testing Emulsified Asphalts
- M 208 Standard Specification for Cationic Emulsified Asphalt

ISSA Bulletin #139 "Test Method to Classify Emulsified Asphalt/Aggregate Mixture Systems by Modified Cohesion Tester Measurement of Set and Cure Characteristics"

Manual of Uniform Traffic Control Devices, latest Edition (MUTCD)

2206.3 Crack Sealing/Filling

- A. Crack Sealant Application: Material used for crack sealing shall be a modified asphalt product selected to be

compatible with the environment of application and found to meet the criteria of ASTM D 6690 with a modified resilience value between 30 and 60 percent, or material meeting the requirements of ASTM D 5078. Crack Sealing shall be understood to be the process of placing an asphaltic material into and/or above working cracks to prevent the intrusion of surface water and/or incompressibles into the crack. A working crack shall be understood to correspond to cracks that sustain more than 0.1 inch of movement during the course of the year.

- B. Crack Filling Application: Material used for crack filling shall be a viscosity graded AC-20 asphalt product meeting the criteria of ASTM D 3381 Table 1, a penetration-graded asphalt product having a penetration number in the range of 85-100 measured in accordance with ASTM D 946, or material meeting the criteria of ASTM D 5078. Crack filling material may contain polyester or polypropylene fibers.
- C. Material satisfying the criteria of a crack sealant may also be used as a crack filling material. Crack fillings shall be understood to be the process of placing an asphaltic material into non-working cracks to substantially reduce water infiltration and reinforce adjacent cracks. Crack filling materials shall not be used for sealing pavements in preparation for an overlay.
- D. Equipment
 - 1. Router: This machine shall be an impact cutter head with a minimum of 6 tungsten-carbide cutters. The router blades shall be driven with a minimum 25-hp gasoline engine.
 - 2. Compressor: The compressor shall be a two-stage compressor rated as a minimum 40 CFM unit capable of delivering compressed air to the nozzle at a minimum pressure of 100 psi. The compressor shall be equipped with a filter trap to eliminate oil and moisture from the air line.
 - 3. Hot-Air Lance (HCA): The hot air lance shall be capable of delivering super-heated air at an exit temperature in excess of 1500 degrees F and at a velocity in excess of 1000 ft/sec against the side walls of the crack. The hose shall be wrapped with reflective tape to keep hoses together and to protect workers in low light situations.
 - 4. Melter/Applicator
 - a. The melting pot shall consist of double-boiler type jacket and shall be equipped with a full sweep agitator that promotes proper mixing and maintains uniform heat distribution throughout the melting pot. The melting pot shall have sufficient capacity of the heat transfer oil reservoir that heat transfer oil is able to come in contact with 100 percent of the outside area of the jacket. The melting pot shall be equipped with a drain plug to permit 100% of the heat transfer oil to drain from the boiler. The heat transfer oil shall consist of ISO grade 68.
 - b. The heat transfer oil shall be heated with a properly sized vapor fuel LP or diesel fuel burner. The heat shall be applied directly to the bottom of the heat transfer tank. The burner shall be lit by an electric spark igniter controlled by a sensor, which detects a lack of burn or ignition and subsequently shuts down the fuel supply. The unit must be capable of starting at ambient temperature and bringing the sealant up to the required applications temperature within the period of approximately one hour while continuously agitating and recirculating the sealant. The unit shall have the capability of independently monitoring both the transfer oil and melting pot temperatures. The unit shall be capable of heating a variety of application materials within a range of temperatures between 200 ° F and 425 ° F. The sealant should not be heated to a temperature in excess of that specified by the manufacturer.
 - c. The agitator and material pump shall be actuated by hydraulic motors driven by a single, pressure-compensated hydraulic pump. Hydraulic fluid should only be pumped to the agitator or material pump motor on demand.
 - d. The sealant shall be applied to the pavement through an application system consisting of a pressure feed hose and wand. The hose shall be specially manufactured to handle liquid

asphalt products up to 450 ° F at 350 psi working pressure. The hose shall not be less than 15 feet in length. The hand wand shall be constructed of steel of sufficient strength to withstand normal day-to-day operations. Material flow through the wand shall be controlled with a toggle switch. A squeegee shall be used to distribute the asphalt evenly and uniformly in the recommended configuration.

- e. All equipment shall be in good working order, as determined by the Engineer, on a day-to-day basis. The Engineer shall not be responsible for payment of labor or rental charges on days when the equipment is not in good working order.

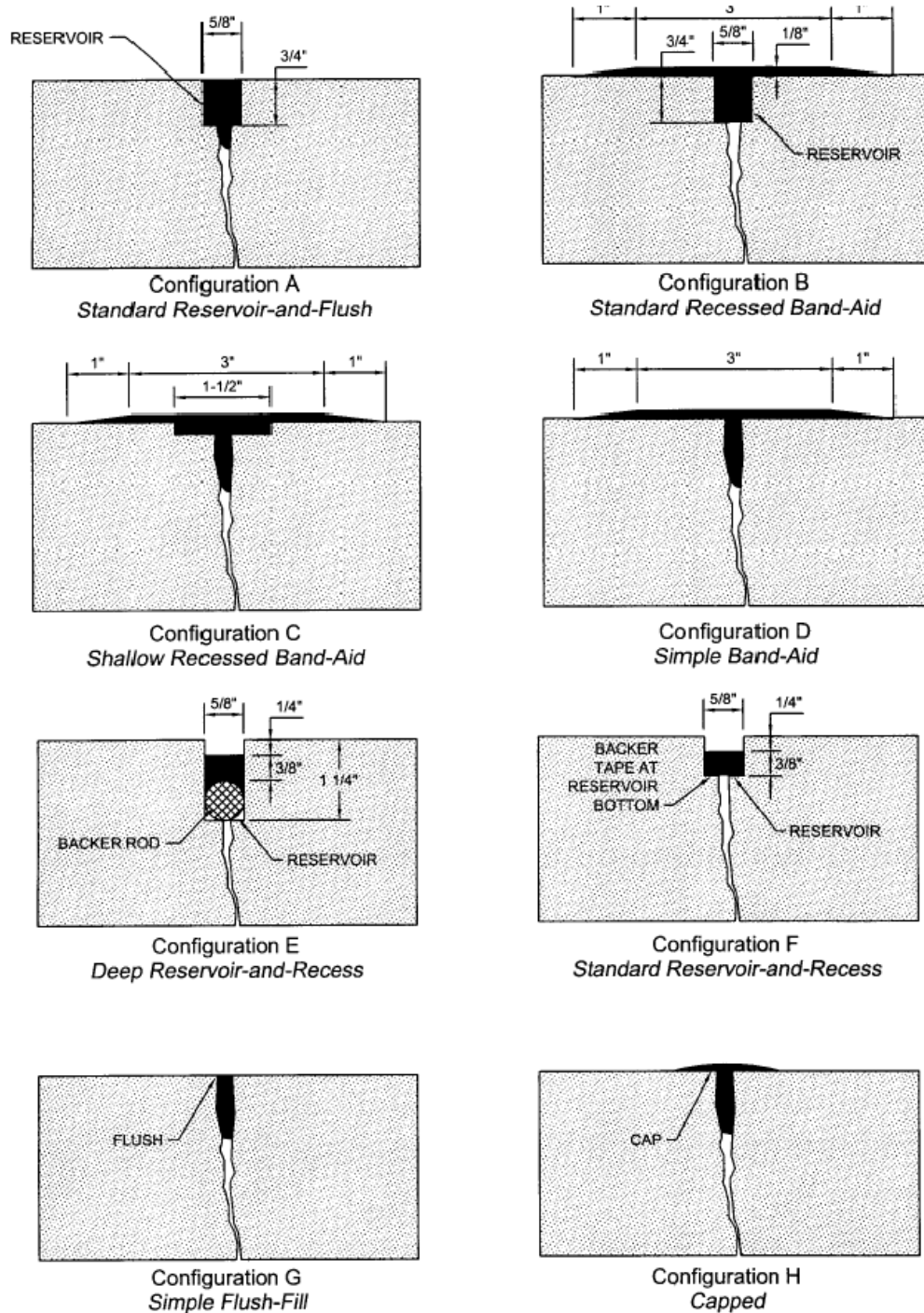
E. Preparation

1. Crack sealing shall be limited to working, transverse and longitudinal cracks that are more than 1/8-inch in width. Cracks 1/8- to 5/8-inches in width requiring sealing shall be routed to 5/8-inches in width. Cracks 5/8- to 1-inch in width requiring sealing do not require routing but shall be thoroughly cleaned and sealed. Cracks shall be sealed using either the Standard Reservoir and Flush or Standard Recessed Band-Aid configurations. Cracks greater than 1-inch in width shall be filled with either an emulsion slurry and sand, widened and backfilled with Hot-Mix Asphalt (HMA) in compliance with Section 2205, or repaired in a manner approved by the Engineer. Cracks requiring filling do not require any routing but simply thorough cleaning. Cracks shall be filled using either the Simple Band-Aid, Simple Flush Fill, or Capped configurations.
2. Cracks shall be clean and free of all deleterious materials, including any old sealant, incompressibles, and organic material. The crack shall be free of any standing water and any moisture along the sidewalls of the crack as evidenced by a darker color than the adjacent pavement. This shall be accomplished in one of three manners: wire-brushing – where the crack channels are cleaned with a mechanical wire brush followed by high-pressure compressed air; hot air blasting – where the crack channels are cleaned, heated, dried with hot compressed air (HCA) lance connected to a high pressure air compressor; or high-pressure air blasting – where the crack channels are cleaned with high-pressure compressed air. Pavement cracks to be sealed or filled shall be cleaned and dried using one of the methods described previously within 10 minutes of the application of the sealer/filler. Equipment for the two operations should be kept in a compact configuration such that not more than 50 feet separates equipment required by the two operations. Additionally, not more than 10 minutes time shall pass between the cleaning of a crack and the filling of the crack with the appropriate sealing/filling material.

F. Installation

1. Sealer/filler materials should not be applied when the pavement surface is wet or when the pavement temperature is less than 40 ° F without the use of hot air blasting or the approval of the Engineer.
2. Sealant/Crack filler should be applied to fill the crack from the bottom to the top in order to prevent air bubbles from forming and creating a point of weakness in the sealant. Upon application, hot sealant/filler material should not make a hissing or popping noise indicative of moisture in the crack. Noises of this kind should indicate that additional drying of the crack is necessary in order to facilitate proper bonding of the material to the sidewalls of the crack. Application of the sealant/filler material shall be made in such a way as to completely fill the crack and provide enough excess to facilitate completion of the seal/fill consistent with the configuration selected. The use of a squeegee or applicator disk to shape the application material to conform to one of the material placement configurations shown on Figure 1 is required. Care shall be taken not to place any sealant/filler material on top of any pavement markings, manholes, or drainage castings. The Contractor shall be responsible to prevent tracking of the sealant/filler material onto the adjacent pavement surfaces to the satisfaction of the Engineer.

3. The manufacturer's technical representative shall be notified by the Contractor and shall be present during the initial installation. Prior to beginning the work, the Contractor will be required to demonstrate to the satisfaction of the Engineer and the manufacturer's representative his ability to apply the material in accordance with the manufacture's specifications. Operations and procedures which are considered by the Engineer as detrimental to the effectiveness of the material will not be permitted.



Material placement configurations for crack treatments

Figure 1

2206.4 Improved Street Chip Seal

A. Description: This work shall consist of the application of a thin, uniform layer of emulsified asphalt to the existing pavement surface in order to universally seal cracks from the intrusion of surface water. Cover aggregate shall then be uniformly distributed upon the asphalt layer and seated in place with the use of a rubber-tired roller. Any excess aggregate material shall be removed, leaving a durable wearing surface.

B. Material Requirements

1. Emulsified Asphalt

- a. The asphaltic sealant material applied to the roadway surface shall consist of a rapid-setting emulsified asphalt either an anionic RS-2 meeting the criteria of ASTM D 977 or a cationic CRS-2 meeting the criteria of ASTM D 2397. These materials may be modified with rubber products in the form of liquid latex, styrene-butidane-rubber, or styrene-butidane-styrene to enhance performance of the material as approved by the Engineer. If a polymer-modified material is used, the emulsified asphalt shall meet the additional specification criteria required by the Engineer.
- b. A sample of the emulsified asphalt may be taken from any of the distributors or delivery tankers on the job site. Failure of the emulsified asphalt to meet the material specification criteria at the time of application shall require the Contractor, at his own expense, to correct all unsatisfactory areas. No additional areas shall be sealed until correction has been made to the satisfaction of the Engineer.

2. Cover Aggregate – Pre-coated Chips

- a. Materials: Aggregate materials shall consist of an approximately cubic and uniformly-graded, hard, durable 100 percent crushed and washed limestone, sandstone, lightweight aggregate, basalt/porphyry, granitic material, steel slag, gravel, or chat. Chat is a by-product from the production of lead and zinc from the area located in southwestern Missouri, northeastern Oklahoma, and southeastern Kansas. Lightweight aggregate shall consist of expanded shale. The application rates reported in these specifications is for the Bethany Falls Limestone in the Kansas City area. The specific gravity of this material is approximately 2.58.

- b. Physical properties required of the aggregate materials:

Los Angeles Abrasion (ASTM C131)	35% loss (maximum)
Soundness using Mag. Sulfate (ASTM C 88, 5 cycles)	18% loss (maximum)
Soundness using Sodium Sulfate (ASTM C 88, 5 cycles)	12% loss (maximum)
Total Shale, clay, coal, and lignite content (ASTM C 142)	0.5% by weight (max)
Absorption	4.0% (max)

- c. Gradation: Gradation of cover aggregates shall conform to the following percentages:

<u>Sieve Size</u>	<u>Percent Passing</u>
3/4" (19mm)	100
1/2" (12.5mm)	90-95
3/8" (9.5mm)	30-50
No. 4 (4.75mm)	0-5
No. 8 (2.36mm)	0

- d. Pre-coating of Chips: Aggregate chips shall be uniformly heated in a dryer until surface dry. All material shall be free of moisture, dust, and lumps and shall be approved by the Engineer prior to use. The aggregate chips shall then be pre-coated with 0.9%+ 0.025% a liquid asphalt cement having a viscosity of 2000 poise, +20%. The asphaltic material and hot aggregate shall be measured separately and accurately immediately before introduction into the mixer. Mixing shall be accomplished at a temperature between 275 ° F and 325 ° F, sufficient to produce a thoroughly and uniformly coated aggregate. The pre-coated chips shall be stockpiled at least 3 days prior to use.
3. Weighing: Weighing of cover aggregate shall be accomplished by the Contractor on scales that he furnishes for the purpose of weighing the cover aggregate as required in Section 2205.7 entitled "Scales and Weighing of Vehicles." All loads of cover aggregate will be weighed and evidenced by approved delivery tickets showing the net weight in pounds for each load. Two copies of each ticket shall accompany the load to the work site. Upon the load being incorporated in the work, the Engineer will sign both copies and one of these copies will be returned to the Contractor.
- C. Spot Patching: Areas where base failure of the roadway has occurred, or where the surface is broken out shall be repaired prior to the sealing operation. The failed sections will be marked by the Engineer, and shall be removed by sawing a neat rectangular hole into the pavement. The failed material shall be removed without damage to the adjacent pavement. Where base failures have occurred, the pavement shall be removed to the subgrade which shall be corrected to the satisfaction of the Engineer prior to patching. Unstable material shall be overexcavated and replaced with base materials meeting the requirements of Section 2203. All surfaces shall be properly primed and tacked in accordance with Section 2204.

The prepared hole shall be patched with hot-mix asphaltic patching material by placing in layers not to exceed 2 inches; each layer being thoroughly compacted before the next layer is placed. After the patching material is placed and raked to a uniform surface, it shall be thoroughly compacted by rolling with a roller meeting the requirements of Section 2205.8. The edges shall be well bonded with the old surface. The completed patch shall be in the same plane as the existing pavement.

The asphaltic concrete used for patching at the different locations shall be as directed by the Engineer and shall conform to one of the mixes as set out in Section 2205.4.

D. Sealing

1. Cleaning: After all holes and cracks have been repaired to the satisfaction of the Engineer, and immediately before sealing the Contractor shall thoroughly clean the area to be sealed with a mechanical pickup type sweeper to insure proper adhesion of the new seal coat to the existing pavement. The street shall be dry before applying the seal coat.
2. Sealing: After the street has been prepared as set forth above the Contractor shall apply the emulsified asphalt by means of an approved distributor meeting the requirements of Section 2204.4. Provisions shall be made by the Contractor to properly protect the curbs and gutters from the asphaltic spray. Emulsified asphalt shall be applied at a rate between 0.28 and 0.35 gallons per square yard. The specific rate for each job will be determined by the Engineer in the field.

Immediately after the application of the asphalt, the Contractor shall, by means of a self-propelled mechanical spreader, apply a uniform layer of cover aggregate. This material shall be spread at the rate specified by the Engineer. This rate shall be between 18 and 25 pounds per square yard of pre-coated limestone chips. The application rate shall be set to prevent bleeding of the asphaltic material through the cover aggregate. If material is spread on any area in excess of the amount specified by the Engineer, the surplus shall be immediately removed and placed elsewhere as directed. No payment will be made to the Contractor for the picking up and redistribution of such excess. Hand

spreading will be permitted only in those areas not accessible to the mechanical spreader.

Immediately after spreading the cover aggregate, the entire surface shall be rolled with multiple-wheel, pneumatic-type rollers meeting the requirements of Section 2205.8. Rolling shall be continued until a thoroughly compacted surface with a uniform aggregate coverage has been obtained, a minimum of 6 passes. The Engineer may require additional rollers if one roller cannot keep up with the operations. The first pass of the rollers over the cover aggregate shall not exceed 3 miles per hour. The rollers shall not exceed 5 miles per hour during any rolling operation.

Forty-eight hours after spreading the cover aggregate, the entire surface shall be swept with a mechanical pickup type sweeper to remove any loose or excess cover aggregate.

During the sealing operation as described above, the Contractor shall cooperate with the Engineer in arranging a program and schedule of work so traffic may be handled or routed around or through the section being sealed. Whenever possible, the street will be closed; but when this is not possible, the sealing will be done in strips while traffic is diverted to the balance of the street. No traffic will be permitted on the sealed portion of the roadway until rolling is completed. All traffic control signage shall conform to the MUTCD handbook for traffic control in work zones.

When bleeding occurs or more material is required, additional cover aggregate shall be spread as directed. As soon as the cover material has adhered to the surface, and the emulsion is thoroughly cured all excess cover aggregate shall be removed with a mechanical pickup type sweeper. This curing period is generally 48 hours, but may be adjusted by the Engineer.

2206.5 Unimproved Street Chip Seal

A. Description: This work shall consist of the application of a thin, uniform layer of liquified asphalt to the surface of the existing roadway which may either consist of an existing surface of asphaltic concrete pavement or a gravel-surfaced road. Cover aggregate shall then be distributed uniformly upon the liquified asphalt and seated in place with the use of a rubber-tired roller leaving a durable wearing surface.

B. Requirements for Liquified Asphalt Materials

Asphaltic materials used for the sealing of unimproved streets shall be liquified either by the introduction of a diluent (cutback) or by emulsification. The particular grade of cutback material for use on a particular roadway shall be determined by the Engineer. Cutback asphaltic materials shall comply with the requirements of either ASTM D 2027 or ASTM D 2028. The particular grade of emulsified asphalt material for use on a particular roadway shall be determined by the Engineer. Anionic emulsified asphaltic materials shall comply with the requirements for either a rapid or medium-setting emulsion as described in ASTM D 977 while cationic emulsified asphaltic materials shall comply with the requirements for either a medium or rapid-setting emulsion as described in ASTM D 2397.

C. Requirements for Cover Aggregate Materials

1. Aggregate materials shall consist of an approximately cubical and uniformly-sized, hard, durable 100 percent crushed and washed limestone, sandstone, lightweight aggregate, basalt/porphyry, granitic material, steel slag, gravel, or chat. Chat is a by-product from the production of lead and zinc from the area located in southwestern Missouri, northeastern Oklahoma, and southeastern Kansas. Lightweight aggregate shall consist of expanded shale. Due to the variation in specific gravities between these materials, the application rate will need to be adjusted to reflect the change in specific gravity. The application rates reported in these specifications is for the Bethany Falls Limestone in the Kansas City area. The specific gravity of this material is approximately 2.58.

2. Physical properties required of the aggregate materials:

Los Angeles Abrasion (ASTM C 131)	35% loss (maximum)
Soundness using Mag. Sulfate (ASTM C88, 5 cycles)	18% loss (maximum)
Soundness using Sodium Sulfate (ASTM C 88, 5 cycles)	12% loss (maximum)
Total Shale, clay, coal, and lignite content (ASTM C 142)	0.5% by weight (max)
Absorption	4.0% (max)

Aggregate chips applied to cutback asphalt shall be shown to have a moisture content less than 1 percent immediately prior to application. Aggregate chips applied to emulsified asphalt shall be shown to have a moisture content of 3 percent or less immediately prior to application.

Gradation for aggregate chips used for Single sealing:

<u>Square Sieve Size</u>	<u>Percent Passing</u>
1/2" (12.5mm)	100
3/8" (9.5mm)	80-100
No. 4 (4.75 mm)	0-26
No. 10 (2.00mm)	0-2

Gradation for aggregate chips used for the first application of a Double sealing:

<u>Square Sieve Size</u>	<u>Percent Passing</u>
3/4" (19mm)	100
1/2" (12.5mm)	90 to 100
3/8" (9.5mm)	40 to 70
No. 4 (4.75mm)	0 to 15
No. 10 (2.0mm)	0-2

Gradation for aggregate chips used for the second application of a Double sealing shall conform to the gradation for a Single sealing above.

The Contractor shall furnish scales for weighing cover aggregate as required in Section 2201.7 entitled "Scales and Weighing of Vehicles". All loads of cover aggregate will be weighed as required, and evidenced by approved delivery tickets showing the net weight in pounds for each load. Two copies of each ticket shall accompany the load to the work site. In order for the load to be received and incorporated into the work, both copies will be signed by the Engineer (or inspector) and one of these copies returned to the Contractor.

D. Sealing

Sealing shall be accomplished in the same manner as described in Section 2206.3.D except as modified herein. Where a seal coat is applied to a gravel-surface roadway the surface shall be prepared in accordance with Section 2204.4. The surface shall then be primed in accordance with Section 2204.4 prior to the application of the seal coat.

The application rate of cutback asphalt shall be in the range 0.25 to 0.45 gallons per square yard as directed by the Engineer or demonstrated to result in a satisfactory seal in a test strip provided by the Contractor. Anti-Strip agent may be added to Cutback Asphalt at a rate not to exceed 1 percent of the residual asphalt volume as directed by the Engineer in order to improve adhesion of the asphalt to the moist aggregates. The cutback agent shall be thoroughly mixed and blended with the cutback asphalt. The application rate of emulsified asphalt shall be in the range of 0.28 to 0.40 gallons per square yard as approved or directed by the Engineer. The distributor

used shall meet the requirements of Section 2204.4.

Limestone materials shall be spread at the rate specified by the Engineer with the range of 16 to 24 pounds per square yard.

Where double sealing is indicated on the Plans or required by the Engineer, the area shall be treated with two seal coats. The application rate of the asphaltic material for the first application shall be approximately one-half of that used for a single seal with the remainder applied during the second seal application. The application rate of the first application of cover aggregate shall be within the range specified for a single seal. The application rate of the second application shall be approximately one-half the application rate of the first layer.

2206.6 Improved Street Slurry Seal

A. Description: This work shall consist of the application of Slurry Seal Material to an existing surface. The Slurry Seal shall consist of a mixture of emulsified asphalt, mineral aggregate and potable water, properly proportioned, mixed and spread on the surface in accordance with this specification and as directed by the Engineer.

B. Material

1. Emulsified Asphalt: The emulsified asphalt shall conform to Grade SS-1h of ASTM D 977, for emulsified asphalt, or Grade CSS-1h of ASTM D 2397, for cationic emulsified asphalt. Quick-set emulsified asphalts QS-1h and CQS-1h may also be used. They shall conform to ASTM D 977 and ASTM D 2397 respectively, except that the test requirements for cement mixing and storage stability shall not apply. Refer to the International Slurry Surfacing Association (ISSA) Bulletin No. 139. The emulsified asphalt shall have not less than 60% residue after distillation when tested using ASTM D 244 and shall have a penetration of between 40 and 90 when tested using ASTM D 2397 at 77° F. Each load of emulsified asphalt delivered shall have a certificate of analysis/compliance matching the material used in the mix design.
2. Aggregate for Slurry Seal: The mineral aggregate used for this work shall be natural or manufactured crushed granite, slag, or chat which is a byproduct of the milling of lead and zinc ores and shall conform to one of the following grading requirements when tested in accordance with ASTM C 136 and ASTM C 117. All aggregate shall conform to the quality requirements of ASTM D 1073.

GRADING REQUIREMENTS FOR AGGREGATE			
Sieve Size	Amount Passing Sieves, Weight %		
	Type I	Type II	Tolerance
3/8 inch (9.5 mm)	100	100	
No. 4 (4.75 mm)	100	90 – 100	+/- 5%
No. 8 (2.36 mm)	90 – 100	65 – 90	+/- 5%
No. 16 (1.18 mm)	65 – 90	45 – 70	+/- 5%
No. 30 (600 um)	40 – 65	30 – 50	+/- 5%
No. 50 (300 um)	25 – 42	18 – 30	+/- 4%
No. 100 (150 um)	15 – 30	10 – 21	+/- 3%
No. 200 (75 um)	10 - 20	5 – 15	+/- 2%

The percent passing the No. 200 (75 um) sieve shall be determined by ASTM C 117.

3. Mineral Filler: Mineral Fillers are of two types, chemically active and chemically inactive. Both shall conform to ASTM D 242. Chemically active mineral fillers such as Portland cement, hydrated lime, and ammonium sulfate are used to improve workability, regulate the setting time, and, in some cases, to

alter the aggregate gradation. Chemically inactive mineral fillers such as limestone dust, fly ash, and rock dust are used mainly to alter aggregate gradation.

4. Water: All water used shall be potable and shall be free of harmful salts or contaminants.
5. Mix Design: The Engineer shall approve all slurry seal materials and methods prior to mixing and application. The Contractor shall submit a completed and tested slurry seal mix design for the Engineer's approval. The approved test method for emulsified asphalt slurry seal shall be found in ASTM D 3910. The mix design shall be made with the same materials the Contractor will be using on the project. The percentage of each material must be shown on the mix design. Proportions of the mixture shall be as follows unless variations are approved by the Engineer:

	TYPE I	TYPE II
Aggregate for Slurry Seal	8.0 to 12.0 lbs per sq yd 3.63 to 5.44 kg/m ² (dry basis)	13.5 to 16.5 lbs per sq yd 7.32 to 8.95 kg/m ² (dry basis)
Emulsified Asphalt (Residual Asphalt Content)	10.0 to 16.0% by weight of dry aggregate	7.5 to 13.5% by weight of dry aggregate
Mineral Filler	1.5 to 3.0% by weight of dry aggregate	1.5 to 3.0% by weight of dry aggregate
Water	Minimum amount necessary to obtain a fluid and homogenous mixture	Minimum amount necessary to obtain a fluid and homogenous mixture

Once the proper consistency is obtained, changes in proportioning of the various components of the mixture shall be held to a minimum.

6. Application Rates: The slurry seal mixture shall be of proper consistency at all times so as to provide the application rate required by the surface condition and shall be in accordance with the following:

Type I: 8.0 to 12.0 lbs per sq yd

Type II: 13.5 to 20 lbs per sq yd

Application rates are affected by the unit weight of the aggregate, the gradation of the aggregate and the demand of the surface to which the slurry seal is being applied.

7. Equipment: The slurry mixing machine shall be a continuous flow mixing unit and shall be capable of delivering accurately a predetermined proportion of aggregate, water and asphalt emulsion to the mixing chamber and to discharge the thoroughly mixed product on a continuous basis. The equipment shall be capable of pre-wetting the aggregate immediately prior to mixing with the emulsion. The mixing unit of the mixing chamber shall be capable of thoroughly blending all of the components together without violent mixing. The mixing machine shall be equipped with an approved fines feeder that includes an accurate metering device or method to introduce a predetermined proportion of mineral filler into the mixer. The mineral filler shall be fed at the same time and location as the aggregate. The fines feeder shall be required whenever added mineral filler is a part of the aggregate blend. The mixing machine shall be equipped with a water pressure system and fog-type spray bar, adequate for complete fogging of the surface receiving slurry treatment. Attached to the mixer machine shall be a mechanical type squeegee distributor, equipped with flexible material in contact with the surface of the pavement to prevent loss of slurry from the distributor. It shall be maintained so as to prevent loss of slurry on varying grades and crown by adjustments to insure uniform spread. There shall be a steering device and a flexible strike-off. The spreader box shall have an adjustable width.

The box shall be kept clean and build-up of asphalt and aggregate on the box or in the corners shall not be permitted. Use of burlap drags or other drags shall be approved by the Engineer. Hand squeegees, shovels, and other equipment shall be provided if necessary to supplement the slurry mixing machine. Power brooms, power blowers, air compressors, and hand brooms suitable for cleaning the surface and cracks of the existing surface shall be implemented to provide a clean surface.

8. Construction Requirements

- a. Surface Preparation: Immediately prior to applying the slurry, clean the surface of all loose material, mud spots, vegetation, and other objectionable material. Any standard cleaning method used to clean pavements will be acceptable except water flushing. A pickup sweeper must be used unless otherwise approved by the Engineer. Manholes, valve boxes, drop inlets, and other service entrances shall be protected from the slurry seal by a method approved by the Engineer.
- b. Application: The surface shall be pre-wetted by fogging ahead of the slurry box unless waived by the Engineer. Water used in pre-wetting the surface shall be applied at such a rate that the entire surface is damp with no apparent flowing water in front of the slurry box. The slurry mixture shall be of the desired consistency upon deposit on the surface and no additional elements shall be added. Total time of mixing shall not exceed four (4) minutes. A sufficient amount of slurry shall be carried in all parts of the spreader at all times so that a complete coverage is obtained. Overloading of the spreader shall be avoided. No lumping, balling, or unmixed aggregate shall be permitted. No segregation of the emulsion and aggregate fines from the coarse aggregate shall be permitted. If the coarse aggregate settles to the bottom of the mix, the slurry shall be removed from the pavement. No excessive breaking of emulsion shall be allowed in the spreader box. No streaks, such as those caused by oversized aggregate will be left in the finished pavement.
- c. Hand Work: Approved squeegees shall be used to spread slurry in areas not accessible to the slurry mixer. Care should be exercised in leaving no unsightly appearance from the hand work.
- d. Curing: Treated areas shall be allowed to cure for four hours, or until such time as the Engineer permits their opening to traffic.
- e. Weather Limitation: The slurry seal shall not be applied if either the pavement or air temperature is below 60° F and falling. The mixture shall not be applied if the relative humidity exceeds 80%.
- f. Traffic Control: Suitable methods shall be used to protect the slurry from all types of traffic until sufficiently cured to accept traffic. The length of time before traffic is permitted to use the surface depends on the type of emulsified asphalt, mixture characteristics, and weather conditions.
- g. Lines: Care shall be taken to insure straight lines along curb and shoulders. No runoff on these areas will be permitted. Lines at intersections will be kept straight to provide good appearance.
- h. Property Owners Notification: The Contractor shall supply and place door tags on the doors of all involved property owners. The door tag language shall be approved by the Engineer.
- i. Provisions for Public Convenience During Sealing Operation: The Contractor shall provide and maintain sufficient signs, barricades, warning lights, flag persons and watch persons to protect the work and public in a manner satisfactory to the Engineer. Any areas damaged prior to acceptance by the Engineer shall be repaired at the Contractor's expense. "No Parking" signs will be furnished by the Contractor. These signs shall comply with the standards established by the MUTCD with regard to size, color, working height and placement. When "No Parking" signs are posted on the streets with parking meters, the Contractor shall cover the parking meter heads with cloth or paper bags. The Contractor shall take all necessary precautions to protect the public (pedestrian and vehicular) from flying

debris. The Contractor shall use warning signs and devices to warn motorists and pedestrians of work ahead.

2206.7 Improved Street Micro-Surfacing

- A. Description: This work shall consist of the application of a polymer modified asphalt emulsion, mineral aggregate, mineral filler, potable water, and other additives, properly proportioned, mixed and spread on a paved surface in accordance with this specification and as directed by the Engineer.
- B. Materials
1. Emulsified Asphalt: The emulsified asphalt shall be a quick wet polymer modified asphalt emulsion conforming to the requirements specified in ASTM D 2397 or AASHTO M 208 for Grade CSS-1h. The cement mixing test shall be waived for this emulsion. The polymer material shall be milled or blended into the asphalt or emulsifier solution prior to the emulsification process. The emulsified asphalt shall have not less than 62% residue after distillation when tested using ASTM D 244. The temperature for this test shall be held below 280° F. Higher temperatures may cause the polymers to break down. In addition, the emulsified asphalt shall have a penetration of between 40 and 90 when tested using ASTM D 2397 at 77° F (25° C) and shall have a minimum softening point of 135° F when tested using ASTM D 36. Each load of emulsified asphalt delivered shall have a certificate of analysis/compliance matching the material used in the mix design.
 2. Aggregate for Micro-Surfacing: The aggregate shall be a manufactured crushed stone such as granite, or chat which is a by-product of the milling of lead and zinc ores. The aggregate shall be totally crushed with 100% of the parent aggregate being larger than the largest stone in the gradation to be used. The mineral aggregate used shall conform to one of the following grading requirements when tested in accordance with ASTM C 136 and ASTM C 117. All aggregate shall conform to the quality requirements of ASTM D 1073.

GRADING REQUIREMENT FOR AGGREGATE			
Sieve Size	Amount Passing Sieves, Weight %		
	Type I	Type II	Tolerance
3/8 inch (9.5 mm)	100	100	
No. 4 (4.75 mm)	90 – 100	70 – 90	+/- 5%
No. 8 (2.36 mm)	65 – 90	45 – 70	+/- 5%
No. 16 (1.18 mm)	45 – 70	28 – 50	+/- 5%
No. 30 (600 um)	30 – 50	19 – 34	+/- 5%
No. 50 (300 um)	18 – 30	12 – 25	+/- 4%
No. 100 (150 um)	10 – 21	7 – 18	+/- 3%
No. 200 (75 um)	5 - 15	5 – 15	+/- 2%

The combined aggregate prior to the addition of any chemically active mineral filler shall have a sand equivalent of not less than 65 when tested by ASTM D 2419. The aggregate shall have a weighed average loss not greater than 25% using magnesium sulfate when tested by ASTM C 88. Testing of abrasion resistance shall not exceed 30% when tested by ASTM C 131.

3. Mineral Filler: Mineral filler shall be any recognized brand of non-air entrained Portland cement or hydrated lime. The mineral filler shall be free of lumps and accepted upon visual inspections. The type and amount of mineral filler needed shall be determined by a laboratory mix design and will be considered as part of the aggregate gradation.
4. Water: All water used shall be potable and shall be free of harmful salts or contaminants.

5. Additives: Additives may be added to the emulsion mix or any of the component materials to provide the control of the quick-traffic properties. They must be included as part of the mix design and be compatible with the other components of the mix.
6. Mix Design: The Engineer shall approve all micro-surfacing materials and methods prior to mixing and application. The Contractor shall submit a completed and tested micro-surfacing mix design for the Engineer's approval. The approved test method for micro-surfacing shall be found in ASTM D 6372. The mix design shall be made with the same materials the Contractor will be using on the project. The percentage of each material must be shown on the mix design. Proportions of the mixture shall be as follows unless variations are approved by the Engineer.

	TYPE I	TYPE II
Aggregate for Micro-surfacing	10.0 to 20.0 lbs per sq yd 4.53 to 9.07 kg/m ² (dry basis)	13.5 to 16.5 lbs per sq yd 7.32 to 8.95 kg/m ² (dry basis)
Emulsified Asphalt (Residual Asphalt Content)	7.5 to 13.5% by weight of dry aggregate	7.5 to 13.5% by weight of dry aggregate
Polymer Based Modifier	Minimum of 3% solids based on asphalt weight content	Minimum of 3% solids based on asphalt weight content
Additive	As needed	As needed
Mineral Filler	0.0 to 3.0% by weight of dry aggregate	0.0 to 3.0% by weight of dry aggregate
Water	Minimum amount necessary to obtain a fluid and homogenous mixture	Minimum amount necessary to obtain a fluid and homogenous mixture

Once the proper consistency is obtained, changes in proportioning of the various components of the mixture shall be held to a minimum.

7. Application Rates: The Micro-Surfacing mixture shall be of proper consistency at all times so as to provide the application rate required by the surface condition and shall be in accordance with the following:

Type II: 10.0 to 20.0 lbs per sq yd
Type III: 15.0 to 30.0 lbs per sq yd

Application rates are affected by the unit weight of the aggregate, the gradation of the aggregate, and the demand of the surface to which the micro-surfacing is being applied.

8. Equipment
 - a. Micro-Surfacing Mixing Equipment: The micro-surfacing mixing machine shall be specifically designed and manufactured to lay micro-surfacing. The machine shall be self-propelled, continuous flow mixing unit able to accurately deliver and proportion the aggregate, emulsified asphalt, mineral filler, control setting additive, and water to a revolving multi-blade double-shafted mixer and discharge the mixed product on a continuous flow basis. The machine shall have sufficient storage capacity for aggregate, emulsified asphalt, mineral filler,

control additive, and water to maintain an adequate supply to the proportioning controls. On major highway work, the machine may be required to be a self-loading machine capable of loading materials while continuing to lay micro-surfacing. The self-loading machine shall be equipped to allow the operator to have full control of the forward and reverse speed during application of the micro-surfacing material and be equipped with opposite side drivers stationed to assist in alignment. The self-loading device, opposite side drivers stations, and forward and reverse speed controls shall be original equipment manufacturer designed.

- b. Proportioning Devices: Individual volume or weight controls for proportioning each material, and used in material calibration, shall be provided and properly marked.
- c. Calibration: Each mixing unit to be used in the performance of the work shall be calibrated prior to construction. Calibration documentation shall include an individual calibration of each material at various settings, which can be related to the machine metering devices. No machine will be allowed to work on the project until a calibration has been completed. Final calibration sheets shall be provided to the Engineer for acceptance.
- d. Micro-Surfacing Spreading Equipment: The machine shall include a surfacing box with twin-shafted paddles or spiral augers fixed in a spreader box. A flexible front seal shall be provided to insure no loss of mixture at the road surface contact point. The rear flexible seal shall act as a final strike-off and shall be adjustable in width. The spreader box and rear strike-off shall be so designed and operated that a uniform consistency is achieved to produce a free flow of material to the rear strike-off box. The box shall have suitable means provided to side-shift the box to compensate for variations of pavement geometry. A secondary strike-off shall be provided to improve the surface texture. It shall have the same leveling adjustments as the spreader box.
- e. Auxiliary Equipment: Hand squeegees, shovels, traffic control equipment, and other support and safety equipment shall be provided as necessary to perform the work.
- f. Cleaning Equipment: Power brooms, pickup sweepers, power blowers, air compressors, and hand brooms suitable for cleaning shall be utilized to provide a clean surface.

9. Construction Requirements

- a. Surface Preparation: Preparation should include crack sealing to minimize future reflective cracking. Immediately prior to applying the micro-surfacing, the surface shall be cleaned of all loose material, silt spots, vegetation, and objectionable material as determined by the Engineer. Any standard cleaning method used to clean pavements will be acceptable except water flushing. Manholes, valve boxes, drop inlets, and other service entrances shall be protected from the micro-surfacing by a method approved by the Engineer.
- b. Application: If the pavement area to be covered is extremely oxidized and raveled or is concrete or brick, a tack coat may be required at the discretion of the Engineer. The tack coat shall conform to Section 2204 and shall be a SS or CSS grade. The tack coat shall be allowed to break sufficiently before the application of micro-surfacing. The surface shall be pre-wetted by fogging ahead of the spreader box unless waived by the Engineer. Water used in pre-wetting the surface shall be applied at such a rate that the entire surface is damp with no apparent flowing water in front of the spreader box. The micro-surfacing mixture shall be of the desired consistency upon deposit on the surface and no additional elements shall be added. A sufficient amount of material shall be carried in all parts of the spreader box at all times so that a complete coverage is obtained. Overloading of the spreader box shall be avoided. No lumping, balling, or unmixed aggregate shall be permitted. No streaks, such as those caused by oversized aggregate shall be left in the finished surface.
- c. Hand Work: Areas which cannot be reached with the mixing machine shall be surfaced using approved hand squeegees to provide a complete and uniform coverage. If necessary, the area to be hand-worked shall be lightly dampened prior to mix placement. The same type of finish as applied by the spreader box shall be required.
- d. Curing: Micro-surfacing shall be allowed to cure for one hour, or until the Engineer permits

- opening the street to traffic.
- e. Weather Limitation: Micro-surfacing shall not be applied if either the pavement or air temperature is below 60° F and falling. The mixture shall not be applied if the relative humidity exceeds 80%.
 - f. Traffic Control: Suitable methods shall be used to protect the micro-surfacing from all types of traffic until sufficiently cured to accept traffic. The length of time before traffic is permitted to use the surface shall be determined by the Engineer.
 - g. Lines: Care shall be taken to insure straight lines along curb and shoulders. No runoff on these areas will be permitted. Lines at intersections will be kept straight to provide good appearance.
 - h. Property Owners Notification: The Contractor shall supply and place door tags on the doors of all involved property owners. The door tag language shall be approved by the Engineer.
 - i. Provisions for Public Convenience During Surfacing Operation: The Contractor shall provide and maintain sufficient signs, barricades, warning lights, flag persons and watch persons to protect the work and public in a manner satisfactory to the Engineer. Any areas damaged prior to acceptance by the Engineer shall be repaired at the Contractor's expense. "No Parking" signs will be furnished by the Contractor. These signs shall comply with the standards established by the MUTCD with regard to size, color, working height and placement. When "No Parking" signs are posted on the streets with parking meters, the Contractor shall cover the parking meter heads with cloth or paper bags. The Contractor shall take all necessary precautions to protect the public (pedestrian and vehicular) from flying debris. The Contractor shall use warning signs and devices to warn motorists and pedestrians of work ahead.

SECTION 2207 COLD MILLING

2207.1 Scope

This section governs the furnishing of all labor, materials and equipment for the performance of cold milling pavement surfaces as shown on the Plans and in accordance with the Standard Drawings, the specifications and the Special Provisions. This work will consist of the removal of the existing surface, loading, hauling, and stockpiling, if required, of the milled material and the cleaning of the milled surface.

2207.2 Equipment

Milling the surface of pavements shall be completed by the use of a milling machine conforming to the following:

- A. Machine: The cold milling machine shall be self-propelled and able to automatically control grade and slope of the milled surface. Operate the automatic grade and slope control from a travelling stringline a minimum of 30 feet long, attached the milling machine and operating parallel to the direction of travel. Other methods of positive grade control may be used if approved by the Engineer. The machine shall have the means of milling without damaging the remaining pavement (torn, gouged, shoved, broken, etc.). The machine shall be capable of blading the cuttings into a single windrow or depositing them directly into a truck.
- B. Air Pollution: The machine shall be equipped with a dust suppression system including water storage tanks and high pressure spray bars.
- C. Operating Width: It is desirable that the cutting width be greater than 6 feet. In the event the cutting width is less than 6 feet, a system of electronic grade control for consecutive passes will be required.
- D. Cutting Drum: The cutting drum shall be totally enclosed to prevent discharge of any loosened material on adjacent work areas.

2207.3 Construction

- A. Methods of Operations for Milling
 - 1. Utilities: Street surfaces adjacent to manholes, water valves and other utility extensions shall be completely removed to the full depth of cut specified for the street unless otherwise specified by the Engineer.
 - 2. Material Disposal: All material from the milling operation shall be removed immediately from the surface of the pavement and properly disposed of by the Contractor at an approved disposal area.
 - 3. Surface Conditions: The drum lacing patterns shall produce a smooth surface finish after milling, with groove depths not to exceed 1/4 inch and groove spacing not to exceed 1 inch unless otherwise approved by the Engineer.
- B. Types of Cuts to be made by Milling
 - 1. Leveling: Sufficient passes shall be made such that all irregularities or high spots are eliminated, and that 100% of the surface is milled.
 - 2. Average Depth: Sufficient passes, or cuts, shall be made in order to remove a specified depth over the entire street section. These depths will be designated in the Plans or Special Provisions.

3. Curb Cut: Sufficient passes or cuts shall be made to remove the specified depth at the curb for a specified width. These dimensions will be designated in the Plans or Special Provisions.
 4. Bridge Deck Milling: Sufficient passes, or cuts, shall be made in order to remove the material as specified on the Plans or in the Special Provisions.
- C. Cleanup: All loose asphalt and debris shall be removed from the street surface and curb and gutter. Any material and debris that adheres to the curb and gutter shall be removed.
- D. Opening to Traffic: If the milled area will be opened to traffic prior to surfacing, provide a smooth riding surface by either milling or placing a wedge of hot mix asphalt or other approved material of a thickness and design that will remain in place under traffic. The transition between the milled area and transverse joints shall be a minimum of 1 vertical to 24 horizontal. The transition between the milled surface and manholes, utility fixtures or other appurtenances shall be a minimum of 1 vertical to 12 horizontal. Transitions shall be removed prior to surfacing.

SECTION 2208 PORTLAND CEMENT CONCRETE PAVEMENT

2208.1 Scope

This section governs the furnishing of all labor, materials and equipment for the placement of Portland Cement Concrete Pavement as shown on the Plans and in accordance with the Standard Drawings, the specifications, and the Special Provisions.

2208.2 Referenced Standards

The following standards are referenced directly in this section. The latest version of these standards shall be used. If conflicting standards are referenced, the more stringent standard shall apply.

ASTM

- A 615 Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
- A 775 Standard Specification for Epoxy-Coated Steel Reinforcing Bars
- A 1064 Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
- C 31 Standard Practice for Making and Curing Concrete Test Specimens in the Field
- C 39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
- C 143 Standard Test Method for Slump of Hydraulic-Cement Concrete
- C 172 Standard Practice for Sampling Freshly Mixed Concrete
- C 231 Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
- C 309 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
- C 1064 Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete

- D 1751 Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
- D 1752 Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
- D 2628 Standard Specification for Preformed Polychloroprene Elastomeric Joint Seals for Concrete Pavements
- D 2835 Standard Specification for Lubricant for Installation of Preformed Compression Seals in Concrete Pavements
- D 6690 Standard Specification for Joint and Crack Sealants, Hot-Applied, for Concrete and Asphalt Pavements
- D 7174 Standard Specification for Preformed Closed-Cell Polyolefin Expansion Joint Fillers for Concrete Paving and Structural Construction
- E 965 Test Method for Measuring Surface Macrotexure Depth Using a Sand Volumetric Technique

AASHTO

- M 148 Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
- M 213 Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
- M 324 Joint Sealants, Hot-Poured, for Concrete and Asphalt Pavements

KCMMB Kansas City Metro Materials Board Specifications

Kansas Department of Transportation

Standard Specifications for State Road and Bridge Construction, 2015 Edition

National Concrete Pavement Technology Center Guide Specifications for Concrete Overlays, September 2015, including latest revisions

2208.3 Materials

- A. Concrete: Concrete shall conform to referenced specifications as called out in the Contract Documents. If no direct reference to concrete specifications is included in the Contract Documents, concrete shall meet KCMMB specifications.
1. If KCMMB concrete is specified, an approved KCMMB concrete mix shall be required.
 2. Proposed concrete mix designs for use on the project shall be submitted to Engineer for approval at least two (2) weeks in advance of anticipated use. Mix design shall be approved prior to use of that mix.
 3. Field testing of concrete shall be performed by the Engineer at the frequency required by the referenced specification. Unless otherwise specified, the following tests shall be performed once for every 50 cu yd of concrete placed:
 - a. Sampling of fresh concrete per ASTM C 172
 - b. Slump per ASTM C 143
 - c. Air Content per ASTM C 231
 - d. Temperature per ASTM C 1064
 - e. Cylinders cast per ASTM C 31 and tested per ASTM C 39. Four cylinders shall be cast with one tested at 7 days, 2 tested at 28 days and one held in reserve.
 4. For concrete overlays, material and construction specifications shall be governed by the National Concrete Pavement Technology Center Guide Specifications for Concrete Overlays, September 2015, including latest revisions.
- B. Reinforcement
1. Bars: Non-epoxy coated bars shall conform to ASTM A 615. Epoxy coated bars shall conform to ASTM A 775.
 2. Welded Steel Wire: Welded steel wire fabric shall conform to ASTM A 1064.
 3. Supporting Elements: Representative samples of supporting elements shall be submitted and approved by the Engineer prior to their use in the project.
 4. Fibers: When specified in the Contract Documents, fibers shall be incorporated into the concrete at the rate recommended by the manufacturer but no less than a minimum of 3 pounds per cubic yard of concrete for macro fibers and 1 pound per cubic yard of concrete for micro fibers. Fibers shall meet the requirements of KDOT Standard Specifications for State Road and Bridge Construction, 2015 Edition, Section 1722.2. Micro fibers are used to control plastic shrinkage cracks in concrete while macro fibers control cracking in hardened concrete and are often used as a substitute for traditional crack control steel reinforcing bars or mesh. In addition, macro fibers add toughness, and impact and fatigue resistance to hardened concrete.
- C. Isolation Joint Fillers: Isolation joint fillers shall conform to ASTM D 1751, D 1752, or ASTM D 7174.
- D. Joint Sealing Compounds: Joint sealing compounds shall conform to the standards for the type of sealant specified as listed in the following table:

Joint Seals and Sealants	AASHTO	ASTM

Hot-poured, Polymeric Asphalt Based	M 324	D 6690
Preformed Polychloroprene Elastomeric		D 2628
Lubricant for Installation of Preformed Seal	-----	D 2835
Preformed Expansion Joint Filler	M 213	D 1751, D 1752 or D 7174

- E. Curing Membrane: All material to be used or employed in curing Portland Cement Concrete must be approved by the Engineer prior to its use. It shall be of the liquid membrane type and shall conform to ASTM C 309, Type II, Class B or AASHTO M 148, Type 2, white pigmented.

2208.4 Construction

Portland Cement Concrete Pavement shall be constructed to the configuration, and to the lines and grades shown on the Plans.

- A. Grading, Subgrade Preparation and Base Course: All excavation, embankment, subgrade stabilization or aggregate base course required shall be as defined in Sections 2100 "Clearing, Grading, Excavation and Site Preparation", 2201 "Subgrade Preparation", 2202 "Subgrade Stabilization", and 2203 "Aggregate Base Course". If areas of the subgrade are below the lines, grades and cross-sections shown on the Plans, they shall be brought to the proper line, grade and cross-section by one of the following:
1. Additional fill material placed in accordance with applicable sections.
 2. Areas may be filled with additional thickness of Portland Cement Concrete Pavement.
- B. Surface Preparation for Concrete Overlay: Prepare surface for concrete overlay as specified in the National Concrete Pavement Technology Center Guide Specifications for Concrete Overlays, September 2015.
- C. Forms: All forms shall be in good condition, clean, and free from imperfections. Each form shall not vary more than 1/4 inch in horizontal and vertical alignment for each 10 feet of length.
1. Material & Size: Forms shall be made of metal and shall have a height equal to or greater than the prescribed edge thickness of the pavement slab. Wood forms may be substituted when approved by Engineer and if they are free from warp with sufficient strength for the intended application.
 2. Strength: Forms shall be of such cross-section and strength, and so secured as to resist the pressure of the concrete when struck off, vibrated, and finished, and the impact and vibration of any equipment which they may support.
 3. Installation: Forms shall be set true to line and grade, supported through their length and, joined neatly in such a manner that the joints are free from movement in any direction.
 4. Preparation: Forms shall be cleaned and lubricated prior to each use and shall be so designed to permit their removal without damage to the new concrete.
- D. Joints: Generally joints shall be formed at right angles to the true alignment of the pavement and to the depths and configuration specified by the appropriate standard or as modified by the Plans and specifications. For additional guidance on jointing, see American Concrete Paving Association jointing guides. All joints shall be sealed with sealant meeting the requirements of Section 2208.3.D. Unless specified otherwise on the Plans, specifications, Standard Drawings or Special Provisions, use hot-poured joint sealant.
1. Isolation Joints: Isolation joints shall be placed at all locations where shown on the Plans and Standard

Drawings or as directed by the Engineer.

- a. Isolation joints shall extend the entire width of the pavement and from the subgrade to the surface of the pavement. The material will have a suitable tear strip or removable cap provided to allow for the application of the joint sealer to the required depth.
 - b. Under no circumstances shall any concrete be left across the isolation joint at any point.
 - c. Material: Isolation joints shall be formed by a one-piece, one inch thick preformed joint filler cut to the configuration of the correct pavement section.
 - d. Stability: Isolation joints shall be secured in such a manner that they will not be disturbed during the placement, consolidation and finishing of the concrete.
 - e. Dowels: If isolation joints are to be equipped with dowels they shall be of the size and type specified, and shall be firmly supported in place, by means of a dowel basket or other support method approved by the Engineer, which shall remain in place. Each dowel shall be lightly painted or greased with a product approved by the Engineer.
2. Contraction Joints: Contraction joints shall be placed where indicated and to the depth indicated by the Plans, specifications and Standard Drawings.
 - a. Method: Contraction joints shall be sawed.
 - b. When sawing joints, the Contractor shall begin as soon as the concrete hardens sufficiently to prevent excessive raveling along the saw cut and shall finish before conditions induce uncontrolled cracks, regardless of the time or weather. All sawed joints shall begin with a relief cut that shall be approximately 1/8 inch wide, and a minimum of 1/3 the thickness of the slab unless shown otherwise on the Plans. If the Plans indicate a joint width greater than 1/8" but with no backer rod, the Contractor may saw the initial relief cut to the full width. If a reservoir cut is specified that uses a backer rod, a second stage saw cut which widens the joints to allow the insertion of joint sealing material shall be performed. The second stage saw cut shall not be performed until the concrete is at least 48 hours old and shall be delayed longer when the sawing causes raveling of the concrete. If second stage sawing is performed prior to the completion of the curing period, the Contractor shall maintain the cure by use of materials approved by the Engineer.
 - c. The Contractor shall be responsible for using suitable methods to cut joints straight and in the correct location. The Contractor shall protect joints from damage until completion of the project and shall repair damaged joints to the satisfaction of the Engineer.
 - d. Where not indicated on the Plans or Standard Drawings, joint spacing for concrete overlays shall not exceed 12 times the thickness of the overlay, and shall be constructed such that the larger dimension of any panel does not exceed 125% of the smaller dimension. Joints of adjacent panels shall be aligned. Joints shall intersect pavement free edges at 90 degrees, and shall extend a minimum of 1 foot from the pavement edge. Saw joints shall be one-third the thickness of the slab, or two inches, whichever is greater.
 - e. For bonded concrete overlays, joints shall be located above existing joints, shall be sawed full depth plus one-half inch for overlays up to 4 inches in two stages. The first stage provides a relief cut approximately 1/8 inch wide.
 - f. Dowels: If contraction joints are to be equipped with dowels they shall be of the size and type specified and shall be firmly supported in place and accurately aligned parallel to the pavement line and grade with an allowable tolerance of 1/8 inch.
3. Longitudinal and Construction Joints: Longitudinal joints and construction joints shall be placed as shown on the Plans or where the Contractor's construction procedure may require them to be placed with approval of the Engineer. Longitudinal construction joints (joints between construction lanes) shall be keyed or tied joints of the dimensions shown on the Plans or Standard Drawings. Transverse construction joints of the type shown on the Plans or Standard Drawings shall be placed wherever concrete placement is suspended for more than 30 minutes. Unless shown otherwise on the Plans, do

not place a construction joint within 5 feet of another transverse expansion, contraction or construction joint.

4. Center Joints: Longitudinal center joints shall be constructed using the methods specified in Section 2208.4.D.2 "Contraction Joints".
 5. Tie Bars: Tie bars shall be deformed steel of the dimensions specified by the Plans or Standard Drawings. Tie bars shall be installed at the specified spacing and firmly secured so as not to be disturbed by the construction procedure. Tie bars shall not be placed mechanically or by hand into the plastic concrete during the paving operation unless approved by the Engineer. Tie bars shall not be located within one foot of an intersecting joint.
- E. Placing, Finishing, Curing, and Protection: Concrete shall be furnished in quantities required for immediate use and shall be placed in accordance with the requirements of the applicable specification as stipulated in Section 2208.3.A. Prior to commencing construction, the Contractor shall furnish a concrete delivery plan which includes at a minimum the number of trucks which will be dedicated to the project, the location of the concrete plant, the route and distance from the plant to the job site, and the anticipated rate of concrete usage. It is essential that concrete be delivered in sufficient quantities to prevent stoppage of the paving operation.
1. Concrete Placement: The concrete shall be deposited on the subgrade to the required depth and width of the construction lane in successive batches and in a continuous operation without the use of intermediate forms or bulkheads. The subgrade shall be moistened prior to the placement of concrete. The concrete shall be placed as uniformly as possible in order to minimize the amount of additional spreading necessary. The concrete shall not be permitted to drop freely a distance of greater than 3 feet. While being placed, the concrete shall be vibrated and compacted with suitable tools so that the formation of voids or honeycomb pockets is prevented.
- The concrete shall be well vibrated and tamped against the forms and along all joints. Care shall be taken in the distribution of the concrete to deposit a sufficient volume along the outside form lines so that the curb section can be consolidated and finished simultaneously with the slab.
- No concrete shall be placed around manholes or other structures until they have been brought to the required grade, alignment, and cross slope.
- Concrete shall not be allowed to extrude below the forms.
- Limitations for time of placement and other items not specifically covered by this specification shall be in accordance with the most recent Standard Specifications of the State Department of Transportation for the state the work is being performed in. The Engineer may extend placement time limitations based on field conditions and concrete consistency and workability.
2. Concrete Finishing Methods: The pavement shall be struck off and consolidated with a mechanical finishing machine. Hand finishing methods may be used for small or irregular areas. Furnish paving and finishing equipment applicable to the type of construction as follows:
 - a. Slip-form Machines: Furnish slip-form machines capable of spreading, consolidating, screeding, and float finishing the freshly placed concrete in one pass to provide a dense and homogeneous pavement with minimal hand finishing.
 - b. Self-Propelled Form-Riding Machines: Furnish mechanical, self-propelled spreading and finishing machines capable of consolidation and finishing the concrete with minimal hand finishing. Do not use machines that displace the fixed side forms.
 - c. Manual Fixed-Form Paving Machines: Furnish spreading and finishing machines capable of consolidating and finishing the concrete with minimal hand finishing.

- d. Hand Methods: When finishing by hand methods, concrete shall be consolidated by use of vibrating units operating in the concrete. Unless the vibrating apparatus is such that the full width of concrete is consolidated in a single passage, a definite system or pattern shall be used in the operation of the vibrator so the full width of concrete in each linear foot of lane will receive adequate and uniform consolidation. The system and methods of vibrating shall be subject to approval of the Engineer. Vibrating equipment shall, under no circumstances, be used as a tool for moving concrete laterally on the grade.

3. Concrete Finishing

- a. Do not apply moisture (water, finishing aids, etc.) to the surface of the concrete pavement. The concrete should be provided with proper consistency and workability to place, strike off, consolidate, finish and texture without the addition of moisture. Only in the event of exceptional and unusual circumstances may the Engineer consider allowing a fine, fog mist to be added.
- b. Floating: All surfaces shall be consolidated and floated after strike-off and prior to final surface finish.
- c. Straightedging: Following the floating and while the concrete is still plastic, the surface shall be tested for trueness with a 10-foot straightedge placed parallel to the centerline and operated across the entire width of the pavement. The straightedge shall be advanced in successive stages not to exceed half its length and the operation repeated. Surface deviations greater than 1/8 inch shall be corrected and the straightedging repeated. Straightedging may be eliminated if the pavement smoothness is verified using a profilograph as specified in Section 2211.
- d. Edging: Before final finishing is completed and before the concrete has taken its initial set, the edges of the slab and curb shall be finished to 1/8" radius, or that shown on the Plans or Standard Drawings by the paving equipment, or with hand edging tools.
- e. Final Surface Finish
 - i. Dragged Surface Treatment: For roadways with a design speed of 45 mph or less to be posted at 45 mph or less, astroturf or burlap shall be dragged longitudinally over the finished surface to produce a tight, uniform, textured surface, and the edges shall be rounded in a workmanlike manner.

For roadways to be posted at 50 mph or more, astroturf or burlap shall be dragged longitudinally over the finished surface to produce a tight, uniform, textured surface, and the edges shall be rounded in a workmanlike manner. The texture achieved by the astroturf or burlap drag shall be tested by the Contractor in accordance with ASTM E 965, "Test Method for Measuring Surface Macrottexture Depth Using a Sand Volumetric Technique", to ensure the texture is adequate for skid resistance. Test locations will be determined by the Engineer. The results of ASTM E 965 shall show an average texture depth of any lot, as defined below, and shall have a minimum value of 0.032 inch. Any lot showing an average of less than 0.032 inch but equal to or greater than 0.024 inch will be accepted as substantial compliance but the Contractor shall amend their operation to achieve the required 0.032 inch minimum depth. (It is not the intention of this tolerance to allow the Contractor to continuously pave with an average texture depth of less than 0.032 inch). Any lot showing an average texture depth of less than 0.024 inch shall require diamond grinding of the pavement represented by this lot to attain the necessary texture. Any *individual test* showing a texture depth of less than 0.020 inch shall require diamond grinding of the pavement represented by this lot to attain the necessary texture. Limits of any failing individual test shall be determined by running additional tests at 100 foot intervals before and after the failing test location. All testing of the surface texture shall be completed no later than the day following pavement

- placement.
- ii. Groove Treatment: For roadways to be posted at 50 mph or more, the surface of the traveled lanes shall be grooved in a transverse direction unless specified otherwise in the Plans, Special Provisions, or Specifications. If approved by the Engineer, a suitable longitudinal grooving or a dragged surface treatment as described in Section 2208.4.E.3.e.i may be used in lieu of the transvers grooving. Surface grooving shall be done with a mechanical device such as a wire broom or comb or by hand. The broom or comb shall have a single row of spring steel tines, rectangular in cross section, 1/8 inch to 3/16 inch wide; spaced on 3/4 inch centers of sufficient length, thickness, and resilience to form grooves to a depth of a minimum of 1/8 inch and a maximum of approximately 3/16 inch in the plastic concrete. If grooves are to be installed by hand, the proposed equipment and process to be used shall be approved by the Engineer. This operation shall be done at such time and in such manner that the desired surface texture will be achieved while minimizing displacement of the larger aggregate particles and before the surface permanently sets. Where abutting pavement is to be placed, the grooving should extend as close to the edge as possible without damaging the edge. If abutting pavement is not to be placed, the 6 inch area nearest the edge or 1 foot from the face of the curb is not required to be grooved. For small or irregular areas or during equipment breakdown, grooving may be done by hand methods.
4. Curing: As soon as practical after the concrete is finished it shall be cured with an approved curing method. If a liquid curing membrane is used, it shall be white pigmented and applied in accordance to the manufacturer's directions.
 - a. Method of Applying Curing Membrane: A nozzle producing a uniform fan pattern will be used on all spray equipment when applying the liquid curing membrane. The curing compound should be applied immediately after final finishing, and before the loss of all free water on the surface of the concrete. Normally one smooth, even coat shall be applied at a rate of 150 to 200 square feet per gallon, but two coats may be necessary to ensure complete coverage and effective protection. Second coats should be applied at right angles to the first.
 - b. Curing Formed Surfaces: If the forms are removed from finished concrete pavement within a period of 72 hours or if a slip-form paving machine has been used, all exposed surfaces shall be cured. Curing membrane damaged by joint sawing operations shall be repaired by the Contractor as directed by the Engineer.
 5. Protection: The Contractor shall, at his own expense, protect the concrete work against damage or defacement of any kind until it has been accepted by the Engineer. All vehicular traffic shall be prohibited from using the new concrete pavement until the following criteria have been met:
 - a. Construction traffic: New concrete pavement may be opened to light construction traffic after a minimum of four (4) days of cure time has elapsed and the joints have been protected from the intrusion of foreign material by an approved method. The Contractor may reduce this length of time by one of these options, performed at the expense of the Contractor:
 - i. Achieve a minimum compressive strength of 70% of the 28 day design strength as determined in accordance with ASTM C 39.
 - ii. Achieve a minimum flexural strength of 350 psi using a third point loading method.
 - b. All traffic: New concrete pavement may be opened to all traffic after a minimum of seven (7) days of cure time has elapsed and the joints have been sealed in accordance with Section 2208.4.D. The Contractor may reduce this length of time by one of these options, performed at the expense of the Contractor:
 - i. Achieve a minimum compressive strength of 100% of the 28 day design strength as determined in accordance with ASTM C 39.

- ii. Achieve a minimum flexural strength of 450 psi using a third point loading method.

Concrete pavement that is not acceptable to the Engineer because of damage or defacement shall be removed and replaced, or repaired, to the satisfaction of the Engineer, at the expense of the Contractor.

- 6. Pavement Smoothness: If required by the Contract Documents, pavement smoothness shall adhere to Section 2211. If not required by the Contract Documents, the Engineer shall determine areas to be checked for surface tolerance by the Contractor. The areas identified by the Engineer shall be checked with a 10 foot straightedge placed parallel to the center line at any location within a driving lane. Areas showing high spots of more than 1/4 of an inch in 10 feet shall be marked and ground down with approved grinding equipment to an elevation where the area or spot will not show surface deviations in excess of 1/8 inch when tested with a 10 foot straight edge. Grinding will be performed on the full width of the lane failing to meet the above criteria. The cost of correcting the smoothness and any other associated costs such as traffic control shall be at Contractor's expense.
- 7. Diamond Grinding: If required by the Contract Documents or if pavement smoothness criteria from Section 2208.4.E or Section 2211 are not achieved, the Contractor shall grind the riding surface to reduce or eliminate the irregularities.
 - a. Use a self-propelled grinding machine with diamond blades mounted on a multi-blade arbor. Avoid using equipment that causes excessive ravels, aggregate fractures, or spalls. Provide uniform texture the full width of the lane.
 - b. Transverse grooving will not be required.
 - c. Use vacuum equipment or other continuous methods to remove grinding slurry and residue. Prevent the grinding slurry from flowing across lanes being used by traffic or into streams, lakes, ponds or other bodies of water, inlets, storm sewer or other drainage system.
 - d. After corrections have been made to the riding surface, test the pavement for smoothness using the same technique used to determine smoothness originally. Furnish and operate the smoothness measurement equipment, and evaluate the results as specified in Section 2211.
 - e. Perform additional grinding as required to attain the required smoothness. Correct all deviations (in excess of 1/2 inch in a length of 25 feet or 1/4 inch in a length of 10 feet) within each section regardless of the profile index value.
- 8. Temperature Limitation: Concrete work shall be in accordance with the requirements of the state DOT specifications for the state where the work is being performed.
- 9. Backfill: A minimum of 24 hours shall elapse before forms are removed and 5 days shall elapse or the concrete must have attained 75% of its 28 day compressive strength before pavement is backfilled unless otherwise approved by the Engineer.
- 10. Backfill shall be accomplished in accordance with Sections 2100 and 2201 entitled "Clearing, Grading, Excavation and Site Preparation" and "Subgrade Preparation".
- 11. The Contractor shall be responsible for the repair of any existing street pavement damaged by the construction to the satisfaction of the Engineer.
- 12. Joint Sealing and Cleanup: All joints shall be sealed with an approved joint sealer meeting the requirements of Section 2208.3 applied in accordance with this section and the manufacturer's directions within 7 days of the placement of the concrete and prior to the opening of the pavement to traffic. If pavement design does not specifically require the use of joint sealant, prepare the joint as described on the Plans or in the specifications.

The Contractor shall be responsible for the removal of excess dirt, rock, broken concrete, concrete splatters and overspray from the area of the construction.

2208.5 Integral Curb

If required by the Plans, Standard Drawings or Special Provisions, integral curbs shall be placed along the edges of all street pavement, except at such locations as the Engineer may direct.

The integral curb shall be constructed during or immediately following the finishing operation unless otherwise shown on the Plans. Special care shall be taken so that the curb construction does not lag behind the pavement construction and form a "cold joint".

Steel curb forms or integral slip-forming shall be required to form the backs of all curbs except where impractical because of small radii street returns or other special sections.

Concrete shall be consolidated with an approved vibrator.

Curbs shall be finished to the cross-section as shown on the Plans with a mule; or templates supported on the side forms and with a float not less than four feet in length, unless another method is approved by the Engineer.

The finished surface of the curb and gutter shall be checked for no more than 1/4 inch deviation by the use of a 10 foot straightedge and corrected if necessary.

Where grades are flat and while the concrete is still plastic, the flowline of the gutter should be checked by the Contractor to verify positive drainage.

Finishing, edging, curing, protection, jointing, temperature limitations and backfill shall all comply with Section 2208.4. The curb shall have a brush or broom finish.

2208.6 Repairing Defects

Any defect occurring prior to final acceptance of the project or the end of a Contract warranty period shall be repaired by removing and replacing the affected area to the nearest joint, or as directed by the Engineer. After project final acceptance or expiration of the warranty period, repair defects in conformance with the following. Do not begin corrective work until after submitting a plan and receiving the Engineer's approval for repair methods.

Defect Type	Defect Direction	Defect Location	Description	Repair Procedure	Alternate Procedure
Plastic Shrinkage Crack	Any	Anywhere	Only partially penetrates depth	Do nothing	Fill with HMWM2
Uncontrolled Crack	Transverse	Mid-slab	Full-depth	Saw and seal crack	LTR3
Uncontrolled Crack	Transverse	Crosses or ends at transverse joint	Full-depth	Saw and seal the crack; Epoxy uncracked joint	
Uncontrolled Crack	Transverse	Relatively parallel and within 5 ft of joint	Full-depth	Saw and seal the crack; Seal joint	FDR4 to replace crack and joint
Saw cut or Uncontrolled Crack	Transverse	Anywhere	Spalled	Repair spall by PDRS if crack not removed	

Uncontrolled Crack	Longitudinal	Relatively parallel and within 1 ft of joint; May cross or end at longitudinal joint	Full-depth	Saw and seal crack; Epoxy uncracked joint	Cross stitch crack
Uncontrolled Crack	Longitudinal	Relatively parallel and in wheel path 1-4.5 ft (from joint)	Full-depth, hairline or spalled	Remove and replace slab	Cross stitch crack
Uncontrolled Crack	Longitudinal	Relatively parallel and further than 4.5 ft from a long joint or edge	Full-depth	Cross-stitch crack; Seal longitudinal joint	
Saw cut or Uncontrolled Crack	Longitudinal	Anywhere	Spalled	Repair spall by PDRS if crack not removed	
Uncontrolled Crack	Diagonal	Anywhere	Full-depth	FDR4	
Uncontrolled Crack	Multiple per Slab	Anywhere	Two cracks dividing slab into 3 or more pieces	Remove and replace slab	

HMWM = High molecular weight methacrylate poured over surface and sprinkled with sand for skid resistance.

LTR = Load-transfer restoration; 3 dowel bars per wheel path grouted into slots sawed across the crack; Slots must be parallel to each other and the longitudinal joint.

FDR = full-depth repair; 10 ft long by one lane wide. Extend to nearest transverse contraction joint if 10 ft repair would leave a segment of pavement less than 10 ft long.

PDR = partial-depth repair; Saw around spall leaving 2 in between spall and 2 in deep perimeter saw. Chip concrete free, then clean and apply bonding agent to patch area. Place a separating medium along any abutting joint or crack. Fill area with patching mixture.

Cross-stitching: for longitudinal cracks only, drill $\frac{3}{4}$ " holes at 35° angle, alternating from each side of joint on 30-36 inch spacing. Epoxy #5 epoxy coated deformed steel tie-bars into hole.

SECTION 2209 CURBING

2209.1 Scope

This section governs the furnishing of all labor, materials and equipment for the construction or reconstruction of curbing as shown on the Plans and in accordance with the Standard Drawings, the specifications, and the Special Provisions.

2209.2 Referenced Standards

The following standards are referenced directly in this section. The latest version of these standards shall be used. If conflicting standards are referenced, the more stringent standard shall apply.

ASTM

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

2209.3 Materials

All Materials shall conform to Section 2208.3. Materials submittals and testing shall conform to Section 2208.

2209.4 Construction

The curbing shall be constructed or reconstructed to the configuration and to the lines and grades shown on the Plans.

- A. Removal of Existing Curbing for Reconstruction: Existing curbing shall be totally removed to the nearest contraction or expansion (isolation) joint or with the approval of the Engineer it may be sawed provided no free section is left that is less than 5 lineal feet in length, and provided the entire curbing section is sawed a minimum of 2 inches below any exposed surface, or sufficiently to prevent disturbance or damage to all adjacent structures or slabs, whichever is greater.
- B. Grading and Subgrade Preparation: All excavation or embankment shall conform to Sections 2100 and 2201 entitled "Clearing, Grading, Excavation and Site Preparation" and "Subgrade Preparation".

Compaction shall conform to Section 2201.4.B.
- C. Forms: All forms shall be in good condition, clean, and free from imperfections. Each form shall not vary more than 1/4 inch in horizontal and vertical alignment for each 10 feet in length. Face forms will be used when feasible. Forms shall have a height equal to or greater than the height of the curb face being formed. The forms shall be set true to line and grade and shall be supported to stay in position while depositing and consolidating the concrete. The forms shall be designed to permit their removal without damage to the concrete. The forms shall be lubricated.
- D. Slip-Form Curb Machine: A slip-form curb machine may be used in lieu of forms. The machine must be equipped with mechanical internal vibrators and be capable of placing curb to the correct cross section, line and grade within the allowable tolerances.
- E. Joints: The joints shall be formed at right angles to the alignment of the curbing and to the depths specified by the appropriate Standard Drawing or as shown on the Plans. Joints should be aligned with concrete pavement joints where feasible.
 - 1. Isolation Joints: Isolation joints shall be placed at all radius points, driveways, curb inlets, or where directed by the Plans or Engineer.

- a. Material: Isolation joints shall be formed by a one piece, one inch thick preformed joint filler cut to the configuration of the correct curb section, and conforming to Section 2208.3.D.
 - b. Stability: Isolation joints shall be secured in a manner so they will not be disturbed by depositing and consolidating of concrete.
 - c. Edging: The edges of the joints shall be rounded with an edging tool of 1/4 inch radius.
 - 2. Contraction Joints: Curbing shall have contraction joints at intervals of not less than 10 feet or more than 15 feet. They shall extend through the entire curb section from the top of the curb to a depth 2 inches below pavement surface.
 - a. Method: Contraction joints shall be formed or sawed.
 - i. When sawing joints, the contractor shall begin as soon as the concrete hardens sufficiently to prevent excessive raveling along the saw cut and shall finish before conditions induce uncontrolled cracks, regardless of the time or weather. When joint sealing backup material is specified with sawed joints, the first stage, which provides a relief cut shall be approximately 1/8 inch wide, and shall be to Plan depth. The second stage which widens the joints to allow the insertion of joint sealing backup material to Plan depth shall not be performed until the concrete is at least 48 hours old, and shall be delayed longer when the sawing causes raveling of the concrete. If second stage sawing is performed prior to the completion of the curing period, the Contractor shall maintain the cure by use of curing tapes, plastic devices, or other materials approved by the Engineer.
 - ii. When forming joints, templates shall be 1/8" metal cut to the configuration of the curbing section. The templates shall be secured at the proper locations so that they will not be disturbed by the depositing of concrete. The templates shall be removed as soon as the concrete has attained its initial set and finished with a 1/4 inch radius on all exposed edges.
 - b. Joint Sealer: When specified, joint sealants shall conform to Section 2208.3.
- F. Concrete Work: Concrete for curbing shall be placed in accordance with the requirements of Section 2208.4. Isolation and contraction joints shall be constructed as shown on the Plans, Standard Drawings, or where directed by the Engineer.
- 1. Concrete Placement: Concrete shall be mechanically vibrated and shall not be allowed to extrude below the forms to cause an irregular alignment of the abutting street pavement.
 - 2. Finishing: After placing and initial strike-off the curb shall be tooled to the required radii. If the surface of the concrete is sufficiently wet that a ridge is formed at the inside of the radius tool, finishing will cease until the excessive moisture has evaporated.

After initial set, the face forms shall be removed and the surface finished to the required dimensions. No water, dryer, or additional mortar shall be applied to the free surface of the concrete.

The finished surface of the concrete shall be broomed perpendicular to the curb with a clean broom to provide an antiskid surface.

In all cases the finished curb shall have a true surface, free from sags, twists, or warps, and shall have a uniform color and appearance.
 - 3. Curing: As soon as practical after the concrete is finished it shall be cured with a liquid curing membrane meeting the requirements of Section 2208.4.E.4, applied according to the manufacturer's

directions.

If front and/or back forms are removed from finished curbing within a period of 72 hours of placement these surfaces shall also be cured.

Wet burlap, cotton mat, waterproof paper, polyethylene sheeting or earth backfill is not an acceptable curing method for curbing.

4. Protection: The Contractor shall protect the concrete work against damage or defacement of any kind until it has been accepted by the Engineer. Concrete which is damaged or defaced, shall be removed and replaced, or repaired to the satisfaction of the Engineer, at the expense of the Contractor.
5. Temperature Limitations: Concrete work shall be performed in accordance with requirements of the state DOT specifications for the state where the work is being performed.
6. Backfill: Backfill shall conform to Section 2208.4.E.9. The Contractor shall be responsible for the repair of any pavement disturbed by the construction to the satisfaction of the Engineer.
7. Joint Sealing and Clean-Up: Unless otherwise specified or waived by the Engineer, an approved joint sealer shall be applied in accordance with the manufacturer's directions within 7 days of the placement of the concrete. The Contractor shall be responsible for the removal of excess dirt, rock, broken concrete, concrete splatters and overspray from the area of the construction.
8. Surface Tolerances: Curbing shall have a surface tolerance of 1/4 inch in 10 feet when checked with a ten foot straightedge.
9. Repairing Defects: Defects in the concrete shall be repaired in accordance with Section 2208.6.

SECTION 2210

This section has been intentionally left blank.

SECTION 2211 SMOOTHNESS

2211.1 Scope

This section governs the furnishing of all labor, materials and equipment for the determination of pavement surface smoothness, evaluation of results, and corrective actions as shown on the Plans and in accordance with the Contract Documents, Standard Drawings, the specifications and the Special Provisions.

2211.2 Referenced Standards

The following standards are referenced directly in this section. The latest version of these standards shall be used. If conflicting standards are referenced, the more stringent standard shall apply.

Kansas Department of Transportation

Standard Specifications for State Road and Bridge Construction, 2015 Edition
Kansas Test Method KT-46 from KDOT Construction Manual, latest revision

2211.3 Equipment

Equipment for determination of pavement smoothness and performance of corrective actions shall be in compliance with the specifications of the Kansas Department of Transportation (KDOT), Sections 503 and 603.

2211.4 Construction

If specified in the Contract Documents, profilographing shall be performed on roadways classified as arterials, major collectors, freeways, expressways and interstates.

- A. Exceptions: Unless otherwise specified in the Contract Documents, profilographing will not be required for local roads or minor collectors. In addition, other exceptions shall be as specified in the state DOT specifications for the state the work is being performed in.
 - 1. Finished pavements on local roads, minor collectors and other areas exempted from profilographing shall be checked with a 10 foot straightedge placed parallel to the center line at any location within a driving lane. Areas showing high spots of more than 1/4 of an inch in 10 feet shall be marked and ground down with approved grinding equipment to an elevation where the area or spot will not show surface deviations in excess of 1/8 inch when tested with a 10 foot straight edge. Grinding will be performed on the full width of the lane failing to meet the smoothness criteria. The cost of correcting the smoothness and associated traffic control shall be at Contractor's expense.
- B. Profilographing: Profilograph testing and evaluation shall be performed in accordance with the Kansas Department of Transportation (KDOT), Sections 503 and 603. Within two days after the paving, furnish the Engineer with the profilogram and its evaluation.
- C. Corrective Actions: Corrective actions shall be performed at the Contractor's expense and in accordance with the Kansas Department of Transportation (KDOT), Sections 503 and 603.
- D. Final Report: The Contractor shall submit a final report to the Engineer with final profilograph results verifying compliance with the specified pavement smoothness requirements.
- E. Pay Adjustments: No pay adjustments (incentive or disincentive) shall be made to the smoothness or pavement items based on the results of the profilograph testing.

END OF SECTION

TECHNICAL PROVISIONS

Section 2300

Incidental Construction



Unified Government of Wyandotte County

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2301 STANDARD SIDEWALKS, SIDEWALK RAMPS, DRIVEWAYS, AND BICYCLE /PEDESTRIAN PATHS

2301.1 Scope

This section governs the furnishing of all labor, materials and equipment for the construction or reconstruction of sidewalks, sidewalk ramps driveways, and bicycle/pedestrian paths as shown on the Plans and in accordance with the Standard Drawings, the specifications and the Special Provisions.

2301.2 Referenced Standards

The following standards are referenced directly in this section. The latest version of these standards shall be used. If conflicting standards are referenced, the more stringent standard shall apply.

ADAAG – ADA Accessibility Guidelines Section 4.7 – Curb Ramps

PROWAG - Public Rights-of-Way Accessibility Guidelines

ASTM

A 615	Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
A 775	Standard Specification for Epoxy-Coated Steel Reinforcing Bars
A 1064	Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
C 31	Standard Practice for Making and Curing Concrete Test Specimens in the Field
C 39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
C 143	Standard Test Method for Slump of Hydraulic-Cement Concrete
C 172	Standard Practice for Sampling Freshly Mixed Concrete
C 231	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
C 309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
C 920	Standard Specification for Elastomeric Joint Sealants
C 1064	Standard Test Method for Temperature of Freshly Mixed Hydraulic-Cement Concrete
D 1751	Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
D 1752	Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction
D 2805	Standard Test Method for Hiding Power of Paints by Reflectometry
D 7174	Standard Specification for Preformed Closed-Cell Polyolefin Expansion Joint Fillers for Concrete Paving and Structural Construction

AASHTO

M 148	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

KCMMB Kansas City Metro Materials Board Specifications

Kansas Department of Transportation

Standard Specifications for State Road and Bridge Construction, 2015 Edition

2301.3 Materials

- A. Concrete: Concrete shall conform to referenced specifications as called out in the Contract Documents. If no

direct reference to concrete specifications is included in the Contract Documents, concrete shall meet KCMMB specifications.

1. An approved KCMMB concrete mix shall be required.
 2. Proposed concrete mix designs for use on the project shall be submitted to Engineer for approval at least two (2) weeks in advance of anticipated use. Mix design shall be approved prior to use of that mix.
 3. Field testing of concrete shall be at the Contractor's expense and performed by an ACI certified materials testing firm acceptable to the Owner. Unless otherwise specified, the following tests shall be performed once for every 50 cuyd of concrete placed:
 - a. Sampling of fresh concrete per ASTM C 172
 - b. Slump per ASTM C 143
 - c. Air Content per ASTM C 231
 - d. Temperature per ASTM C 1064
 - e. Cylinders cast per ASTM C 31 and tested per ASTM C 39. Four cylinders shall be cast with one tested at 7 days, 2 tested at 28 days and one held in reserve.
- B. Reinforcement: Reinforcement is not required unless shown on the Plans, Standard Drawings or in the Special Provisions. If specified to be used, reinforcement shall meet the following requirements:
1. Bars: Non-epoxy coated bars shall conform to ASTM A 615. Epoxy coated bars shall conform to ASTM A 775.
 2. Welded Steel Wire: Welded steel wire fabric shall conform to ASTM A 1064.
 3. Supporting Elements: Representative samples of supporting elements shall be submitted and approved by the Engineer prior to their use in the project.
 4. Fibers: When specified in the Contract Documents, fibers shall be incorporated into the concrete at the rate recommended by the manufacturer but no less than a minimum of 3 pounds per cubic yard of concrete for macro fibers and 1 pound per cubic yard of concrete for micro fibers. Fibers shall meet the requirements of KDOT Standard Specifications for State Road and Bridge Construction, 2015 Edition, Section 1722.2. Micro fibers are used to control plastic shrinkage cracks in concrete while macro fibers control cracking in hardened concrete and are often used as a substitute for traditional crack control steel reinforcing bars or mesh. In addition, macro fibers add toughness, and impact and fatigue resistance to hardened concrete.
- C. Isolation Joint: Isolation joints shall be formed by a one piece, 1/2-inch thick non-extruding preformed joint filler cut to the configuration of the abutting section. The filler material shall be full depth, and shall conform to ASTM D 1751, D 1752, or D 7174. ASTM D 1752 material shall be used against curved surfaces, around utility boxes or poles, or against other irregular surfaces, and may be used for all other applications.
- D. Joint sealer shall meet the requirements of Section 2208.3 or may be an approved one-component, moisture-curing, non-priming, gun-grade, elastomeric polyurethane joint sealant that meets the requirements of ASTM C 920, Type S, Grade NS, Class 25, Use NT and M.
- E. Curing Membrane: All material to be used or employed in curing Portland Cement Concrete must be approved by the Engineer prior to its use. It shall be of the liquid membrane type and shall conform to ASTM C 309, Type II, Class A or B or AASHTO M 148, Type 2, white pigmented.

2301.4 Construction

The sidewalks, sidewalk ramps, driveways or bicycle/pedestrian paths shall be constructed or reconstructed to the configuration, and to the lines and grades shown on the Plans. Generally sidewalks, sidewalk ramps, driveways, and bicycle/pedestrian paths should be constructed after the curbing. Sidewalk ramp construction shall comply fully with all requirements for sidewalks in this section and shall comply with the requirements of ADAAG Section 4.7 and the most current federal guidelines governing sidewalk ramps (i.e. PROWAG).

- A. Removal: Existing sidewalks, sidewalk ramps, driveways, or bicycle/pedestrian paths shall be totally removed to the nearest contraction or isolation joint, unless otherwise specified by the Engineer. The section shall be sawed full depth.
- B. Grading, Subgrade Preparation and Base Course: All excavation, embankment, subgrade stabilization or aggregate base course required shall be as defined in Sections 2100 "Clearing, Grading, Excavation and Site Preparation", 2201 "Subgrade Preparation", 2202 "Subgrade Stabilization", and 2203 "Aggregate Base Course", except as follows:
 - 1. Unless otherwise specified on the Plans, Standard Drawings or Special Provisions, the subgrade shall be compacted until no further consolidation of the material occurs using compaction methods approved by the Engineer. The Engineer will visually determine the acceptance of the subgrade. Satisfactory moisture content shall be achieved to provide sufficient compaction of material as approved by the Engineer.

If during reconstruction operations additional fill material is needed beneath sidewalks or driveways it shall be untreated compacted aggregate conforming to Section 2203.3.A, placed in conformance with Section 2203.4.A.
- C. Forms: All forms shall be in good condition, clean, and free from imperfections. Each form shall not vary more than 1/4 inch in horizontal or vertical alignment for each 10 feet in length.
 - 1. Material and Size: Forms shall be made of metal unless otherwise approved by the Engineer and shall have a height equal to or greater than the depth of the sidewalk, driveway, or bicycle/pedestrian path section. Wood forms may be substituted when approved by Engineer and if they are free from warp with sufficient strength for the intended application.
 - 2. Strength: Forms shall be of such cross-section and strength, and so secured as to resist the pressure of the concrete when struck off, vibrated, and finished, and the impact and vibration of any equipment which they may support.
 - 3. Installation: The forms shall be set true to line and grade, supported through their length and joined neatly in such a manner that the joints are free from movement in any direction.
 - 4. Preparation: Forms shall be cleaned and lubricated prior to each use and shall be so designed to permit their removal without damage to the new concrete.
- D. Slip-form Machine: A slip-form machine may be used in lieu of forms. The machine must be equipped with mechanical internal vibrators and be capable of placing concrete to the correct cross section, line and grade within the allowable tolerances.
- E. Grades and Slopes: The grade and slope along the length of the walk shall conform to the most current version of PROWAG. Unless shown otherwise on the Plans or directed by the Engineer, the cross slope shall be toward the street. The sidewalk cross slope shall be carried through driveways.

F. Joints: Unless directed by the Engineer the joints shall be formed at right angles to the alignment of the sidewalk, driveway, or bicycle/pedestrian path and to the configuration specified by the Plans or Standard Drawings.

1. Joint Patterns

- a. Sidewalk surfaces shall be marked with a transverse joint spaced at a distance equal to the width of the sidewalk. Sidewalks greater than 6 feet in width shall be divided by longitudinal joints spaced not less than 30 inches nor more than 60 inches with transverse joints spaced to form a square pattern. Edger tool marks shall remain showing unless the sidewalk is slip-formed and subsequently sawed. Curb joints should align with sidewalk joints where they abut.
- b. Concrete driveways and bicycle/pedestrian paths shall have a maximum slab dimension no greater than 10 feet, although widths no more than 24 times the slab thickness will be permitted to match existing joint patterns.

2. Isolation joints: Isolation joints shall be placed at locations shown on the Plans and Standard Drawings or as directed by the Engineer.

- a. General: The preformed isolation joint material shall be left 1/2-inch below the surface, or a suitable tear strip will be provided to allow for the application of the joint sealer.
- b. Stability: Isolation joints shall be secured in a manner so they will not be disturbed by depositing and consolidating the concrete.
- c. Edging: The newly poured edges of these joints shall be rounded with an edging tool of 1/4 inch radius.
- d. Spacing: Isolation joints shall be placed at spacing indicated on the Plans or Standard Drawings. Spacing should not exceed 100' from center to center.

3. Contraction joints: Contraction joints shall be 1-inch deep by 1/8-inch wide with 1/4-inch radii rounded edges.

- a. Edging: Edger marks shall remain showing unless the sidewalk, driveway or bicycle/pedestrian path is slip formed and subsequently sawed.
- b. Slip forming: Contraction joints may be sawed 1/8-inch wide by 1/3rd the thickness of the slab.
- c. Joint Sealer: Joint sealer is not required, unless otherwise specified in the Plans, Standard Drawings or Special Provisions.

G. Concrete Work: Concrete shall be furnished in quantities required for immediate use and shall be placed in accordance with the requirements of the applicable specification as stipulated in Section 2208.3.A.

1. Concrete Placement: Deposit and consolidate concrete as close to the final position as possible, beginning at one corner of the forms. Perform necessary hand spreading with shovels or come-alongs, not with rakes or vibrators. All concrete shall be well vibrated unless approved otherwise by the Engineer. Do not walk in the fresh concrete with boots or shoes coated with earth or foreign substances. When concrete is placed on a sloped surface, begin concrete placement at the lowest area.

Limitations for time of placement and other items not specifically covered by this specification shall be in accordance with the most recent Standard Specifications of the Kansas Department of Transportation. The Engineer may extend placement time limitations based on field conditions and concrete consistency and workability.

2. Finishing
 - a. Strike off the concrete with a vibratory screed or a hand strike-off method when adequate consolidation is attained. Immediately after strike-off, the concrete may be bull-floated to remove any high or low spots. Minimize the use of the bull-float.
 - b. Do not finish concrete with water standing on the surface. All edges of the slab shall be carefully finished with a 1/4-inch radius edger.
 - c. After finishing, the surface of the concrete shall be broomed with a fine clean broom to provide an antiskid surface, and the edges and joints retooled unless slip-formed.
 - d. In all cases the finished sidewalk, driveway, or bicycle/pedestrian path shall have a true surface, free from sags, twists, or warps, and shall have a uniform color and appearance.
3. Curing: As soon as practical after the concrete is finished it shall be cured with an approved liquid curing membrane applied according to manufacturer's directions.
 - a. If forms are removed within a period of 72 hours of placement those formed surfaces shall also be cured.
 - b. Wet burlap, cotton mats, waterproof paper, polyethylene sheeting or earth backfill shall not be acceptable as curing methods.
4. Protection: The Contractor shall protect the concrete work against damage or defacement of any kind until it has been accepted by the Engineer. Concrete which is damaged or defaced shall be removed and replaced or repaired to the satisfaction of the Engineer, at the expense of the Contractor.
5. Temperature Limitations: Concrete shall be placed in accordance with requirements of the state DOT specifications for the state where the work is being performed.
- H. Backfill: A minimum of 24 hours shall elapse before forms are removed and 5 days shall elapse or the concrete must have attained 75% of its 28 day compressive strength before pavement is backfilled unless otherwise approved by the Engineer.
- I. Backfill shall be accomplished in accordance with Sections 2100 and 2201 entitled "Clearing, Grading, Excavation and Site Preparation" and "Subgrade Preparation".
- J. The Contractor shall be responsible for the repair of any street pavement damaged by the construction to the satisfaction of the Engineer.
- K. Joint Sealing and Clean-Up: All isolation joints shall be sealed with an approved joint sealer meeting the requirements of Section 2301.3.D applied in accordance with Section 2208.4 and the manufacturer's directions within 7 days of the placement of the concrete and prior to the opening of the pavement to traffic.
- L. The Contractor shall be responsible for the removal of excess dirt, rock, broken concrete, splatters and overspray from the construction area within 10 days unless otherwise directed by the Engineer.
- M. Surface Tolerances: Sidewalks, driveways, and bicycle/pedestrian paths shall have a surface tolerance of 1/4 inch in 10 feet when checked with a 10 foot straightedge. Vertical deflections at sidewalk joints shall not exceed 1/4-inch.
- N. Detectable Warnings: Detectable warnings are required standardized surface features built in or applied to walking surfaces on sidewalks or ramps to warn visually impaired people of hazards on a circulation path. Those hazards include, but are not limited to interfaces between sidewalks and areas where moving vehicles may be present. Detectable warnings shall be in accordance with PROWAG Section R305 and shall be on KDOT's "List of Prequalified Detectable Warning Surface Panels for Curb Ramps and Medians".

SECTION 2302 ASPHALT SIDEWALKS, DRIVEWAYS, AND BICYCLE/PEDESTRIAN PATHS

2302.1 Scope

This section governs the furnishing of all labor, materials and equipment for the construction or reconstruction of asphalt sidewalks, driveways, and bicycle/pedestrian paths as shown on the Plans and in accordance with the Standard Drawings, the specifications and the Special Provisions.

2302.2 Asphalt Sidewalks

Asphalt shall not be used in the construction of any approved permanent sidewalk. Asphalt may be used as material for temporary sidewalks if approved in advance by the Engineer.

2302.3 Asphalt Driveways

Asphalt driveways may be constructed with prior approval of the Engineer in accordance with the provisions of Section 2205 "Asphalt Paving" and Section 2209 "Curbing" as applicable.

2302.4 Asphalt Bicycle/Pedestrian Paths

Asphalt bicycle/pedestrian paths shall be constructed in accordance with the provisions of Section 2205 "Asphalt Paving" and in accordance with the applicable provisions of Section 2302.3. Asphalt shall not be used in the construction of any permanent bicycle/pedestrian path in the Right-of-Way, without a written approval from the County Engineer.

SECTION 2303 ROCK BLANKET

2303.1 Scope

This section governs the furnishing of all labor, materials and equipment for the construction of a protecting blanket of rock or broken concrete on slopes, channel bank or stream banks as shown on the Plans and in accordance with the Standard Drawings, the specifications and the Special Provisions.

2303.2 Materials

The material for rock blanket shall be durable stone or broken concrete containing a combined total of not more than ten percent (10%) of earth, sand, shale, and non-durable rock. It is preferable that the material contain a large percentage of pieces as large as the thickness of the blanket will permit, with enough smaller pieces of various sizes to fill the larger voids. Acceptance of quality and size of material may be made by the Engineer using visual inspection at the job site. If broken concrete is used, all reinforcing shall be removed prior to placement.

Rock Blanket shall be specified by class as shown in the following tables:

Class	Percent Heavier Than									
	1 Ton	1/2 Ton	1/4 Ton	250 lbs	200 lbs	180 lbs	75 lbs	60 lbs	10 lbs	5 lbs
1 Ton	50+	95+								
1/2 Ton	0	50+	95+							
1/4 Ton		0	50+				90+			
Facing					0		50+			90+
Light 24			0		50+					90+
Light18				0		5-15		50-70	85-100	

2303.3 Construction

A trench at the toe of the slope shall be excavated to the elevation as shown on the Plans or to a minimum of 2-feet when not shown. The slopes shall conform to the proper cross section and be compacted to a uniform density as required for adjacent material. The rock or broken concrete shall be placed on the slope, to the prescribed thickness, elevation and extent, and shall be manipulated so that the flat sides are in contact, thereby eliminating large voids. The outside of the blanket shall present an appearance free from segregation and with a proportionate amount of the larger pieces showing.

SECTION 2304 CONCRETE PAVER STONES (FOR MEDIAN TREATMENT)

2304.1 Scope

This section governs the furnishing of all labor, equipment and tools and for the performance of all work necessary to install concrete paver stones as shown on the Plans and in accordance with the Standard Drawings, the specifications and the Special Provisions.

2304.2 Referenced Standards

The following standards are referenced directly in this section. The latest version of these standards shall be used. If conflicting standards are referenced, the more stringent standard shall apply.

ASTM

C 67	Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile
C 140	Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
C 418	Standard Test Method for Abrasion Resistance of Concrete by Sandblasting
C 936	Standard Specification for Solid Concrete Interlocking Paving Units

KCMMB Kansas City Metro Materials Board Specifications

2304.3 Materials

A. Interlocking Concrete Paver Stones (ASTM C 936)

1. Paver stones shall be cobblestone style consisting of full stones, 4-5/8" x 7" x 2-3/8"; two thirds stones, 4-5/8" x 4-5/8" x 2 3/8"; and one third stones, 4-5/8" x 2-5/16" x 2-3/8". The mix of stones sizes shall be approximately 28% full size, 57% two thirds size and 15% one third size.
2. Cementitious Materials: Materials shall conform to the ASTM, AASHTO and other referenced specifications as required by mix design specifications (KCMMB).
3. Aggregates: Aggregates shall conform to the ASTM, AASHTO and other referenced specifications as required by mix design specifications (KCMMB).
4. Other Constituents: Air-entraining agents, coloring pigments, integral water repellents, finely ground silica, etc. shall conform to ASTM standards where applicable, or shall be previously established as suitable for use in concrete.
5. Physical Requirements: The Contractor shall provide a certification showing compliance with the following requirements. The Engineer reserves the right to sample and test materials as deemed necessary.
 - a. Compressive Strength: At the time of delivery to the work site, the average compressive strength shall be not less than 8,000 psi with no individual unit strength less than 7,200 psi, with testing procedures in accordance with ASTM C 140.
 - b. Absorption: The average absorption shall not be greater than 5% with no individual unit absorption greater than 7%.
 - c. Durability: The manufacturer shall satisfy the Engineer either by proven field performance or the laboratory freeze-thaw test that the paving units have adequate durability.
 - i. Proven Field Performance: Satisfactory field performance is indicated when units similar in composition, and made with the same manufacturing processes as those to be supplied to the Contractor, do not exhibit objectionable deterioration after at

least three years. The units used as the basis for proven field performance shall have been exposed to the same environmental factors as is contemplated for the units supplied to the Contractor.

- ii. Freeze–Thaw Test: When tested in accordance with Section 8 of ASTM C 67, specimens shall have no breakage and not greater than 1.0% loss in dry weight of any individual unit when subjected to 50 freeze–thaw cycles. This test shall be conducted not more than 12 months prior to delivery of units.
 - d. Abrasion Resistance: When tested by sandblasting in accordance with ASTM C 418, specimens shall not have greater volume loss than 0.3 cubic inches per square inch. The average thickness loss shall not exceed 1/8-inch.
 - e. Permissible Variations in Dimensions: Length or width of units shall not differ by more than 1/16-inch from approved samples. Heights of units shall not differ by more than 1/8-inch from the specified standard.
 - f. Visual Inspection: All units shall be sound and free of defects that would interfere with the proper placing of unit or impair the strength or permanence of the construction. Minor cracks incidental to the usual methods of manufacturer, or minor chipping resulting from customary methods of handling in shipment and delivery, shall not be deemed grounds for rejection.
- 6. Sampling and Testing: The Engineer or his authorized representative shall be accorded proper facilities to inspect and sample the units at the place of manufacture from the lot ready for delivery. Sampling and testing of units shall be in accordance with ASTM C 140 except as required.
- 7. Rejection: In case the shipment fails to conform to the specified requirements, the manufacturer may sort it, and new test units shall be selected at random by the Engineer from the retained lot and tested at the expense of the manufacturer. In case the second set of test units fails to conform to specified requirements, the entire lot shall be rejected.
- 8. Expense of Tests: The expense of inspection and testing shall be borne by the Engineer except as specified otherwise above.
- B. Base Course Concrete: Base course concrete shall conform to the requirements of an approved KCM MB 4K mix.
- C. Sand for Laying Course: The sand for the laying course shall be well graded, clean, washed, sharp sand with 100% passing a 3/8" sieve size and a maximum of 3% passing a No. 200 sieve size. This is commonly known as manufactured concrete sand, limestone screening, or similar. Mason Sand will not be permitted.

2304.4 Construction

- A. Product Handling: Paver stones shall be delivered and unloaded at jobsite on pallets and bound in such a manner that no damage occurs to the product during handling, hauling and unloading.
- B. Edge Restraint: All edges of the installed paver stone shall be restrained by the concrete curb, concrete sidewalk, or another suitable method for preventing the movement of the edge stones.
- C. Concrete Base Course: A concrete base course shall be constructed in accordance with the requirements of Section 2301. The base course shall be shaped to the grade and cross section as shown on the plans with an allowable tolerance of 1/4-inch. The base course shall be 4-inches thick, and should be graded to allow a 1-inch thick sand course between the base and the paving stones, unless shown otherwise on the Plans.

Payment for concrete base course shall be subsidiary to other bid items. The finished base course must be approved by the Engineer before the placement of the sand laying course. The uncompacted sand laying

course shall be spread evenly over the area to be paved and then screened to a level that will produce 1-inch thickness when the paver stones have been placed and vibrated. Once screened and leveled to the desired elevation, the sand laying course shall not be disturbed in any way.

- D. Placing Paver Stones: The paver stones shall be installed in rows perpendicular to the major axis of the median being paved. Within each row the stone sizes shall be randomly mixed so that joints between stones are not normally aligned with joints between stones in adjacent rows. No joints shall be aligned for more than three consecutive rows. The paver stones shall be laid in such a manner that the desired pattern is maintained and the joints between the stones are as tight as possible. For maximum interlock it is recommended that joints between stones do not exceed 1/8 inch. String lines should be used to hold all pattern lines true.

The gaps at the edge of the paver surface shall be filled with standard edge stones or with stones cut to fit. Cutting shall be accomplished to leave a clean edge to the traffic surface using a double-headed breaker or a masonry saw. However, when cutting precision designed areas, a masonry saw is recommended. Whenever possible, no cuts should result with a paver less than 1/3 of original dimension.

Paver stones shall be vibrated to their final level in the sand laying course by two or three passes of a vibrating compactor capable of 3,000 to 5,000 pounds compaction force with the surface clean and joints open. After vibration, clean concrete sand containing at least 30% of 1/8-inch particles shall be spread over the paver stone surface, allowed to dry, and vibrated into the joints with additional passes of the plate vibrator so as to completely fill the joints.

Surplus material shall then be swept from the surface. Upon completion of work covered in this Section, the Contractor shall clean up all work areas by removing all debris, surplus material and equipment from the site.

After final vibrating, the surface shall be true to grade and shall not vary by more than 1/4-inch when tested with a 10 foot straight edge at any location on the surface.

SECTION 2305 MAINTENANCE OF TRAFFIC

2305.1 Scope

This section governs the furnishing of all labor, equipment and tools and for the performance of all work necessary to provide Maintenance of Traffic as specified herein, as shown on the Plans and in accordance with the Standard Drawings, the specifications and the Special Provisions.

2305.2 Referenced Standards

The following standards are referenced directly in this section. The latest version of these standards shall be used. If conflicting standards are referenced, the more stringent standard shall apply.

ATSSA

Quality Standards for Work Zone Traffic Control Devices

Manual of Uniform Traffic Control Devices, Part VI (MUTCD)

2305.3 General

The Contractor is required to maintain access for pedestrians and vehicles to all properties served by the streets and sidewalks impacted by the construction.

2305.4 Traffic Maintenance and Warning Devices

- A. The Contractor will be responsible for arranging for installation of the necessary traffic control devices (with the exception of the barricades and other channelizing devices) a minimum of 48 hours prior to beginning the project so that inspection can be conducted by the Engineer.

Traffic maintenance devices including barricades, flashing lights, flaggers and other traffic control devices shall be in conformance with "Part VI of the Manual on Uniform Traffic Control Devices" latest edition.

- B. Device Maintenance: The Contractor's representative will make daily inspections of the traffic control devices installed and maintain records of any maintenance required and the date on which it was completed. These records will be maintained for the duration of the project and be incorporated as part of the final records. It shall be the Contractor's responsibility to maintain all traffic control devices in proper working condition and placement at all times. The Contractor shall promptly correct any deficiencies in traffic control.
- C. Traffic Control Plan Revisions: Engineer reserves the right to make adjustments or revisions in traffic handling requirements that may become necessary after construction has started. These changes will be determined on the basis of periodic inspections throughout the duration of the project. Notice of such change will be transmitted to the Contractor and it will be his responsibility to make the necessary changes as soon as practicable after receipt of the notification.

2305.5 Pedestrian Traffic Control

- A. Devices: All traffic control along pedestrian routes (sidewalks) shall meet the requirements of sections of the latest version of the MUTCD. Particular attention should be paid to 6D.01 and 6D.02 for pedestrian safety.
- B. Pedestrian Route Closures: Pedestrian routes shall not be closed unless approved by the Engineer. If a

pedestrian route must be temporarily closed, an alternate accessible route must be maintained.

- C. Pedestrian Access: Accessible pedestrian access to all buildings served by the sidewalk must be maintained at all times during the project.
- D. Pedestrian Routes Protection: Existing pedestrian routes and alternate accessible routes shall be protected from construction activities at all times. This protection may include, but is not limited to, railings, fences, barricades, and covered walkways.

2305.6 Flashers and Other Traffic Control Devices

All traffic control devices shall be maintained in acceptable condition as defined by the latest ATSSA "Quality Standards for Work Zone Traffic Control Devices." Devices in unacceptable or marginal condition as determined above shall be removed from the job site and replaced with devices in acceptable condition.

SECTION 2306 PAVEMENT MARKINGS

2306.1 Scope

This section governs the furnishing of labor, equipment, and materials and for the performance of work necessary to furnish and install white and yellow permanent or temporary retro-reflectORIZED pavement marking materials as shown on the Plans and in accordance with the Standard Drawings, the specifications and the Special Provisions.

2306.2 Referenced Standards

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

ASTM

C 321	Standard Test Method for Bond Strength of Chemical-Resistant Mortars
C 501	Standard Test Method for Relative Resistance to Wear of Unglazed Ceramic Tile by the Tile Abraser
D 36	Standard Test Method for Softening Point of Bitumen (Ring and Ball Apparatus)
D 92	Standard Test Method for Flash and Fire Points by Cleveland Open Cup Tester
D 93	Standard Test Methods for Flash Point by Pensky Martens Closed Tester
D 256	Standard Test Method Methods for Determining the Izod Pendulum Impact Resistance of Plastic
D 476	Standard Specification for Titanium Dioxide Pigments, Type II Rutile
D 562	Standard Test Method for Consistency of Paints Using Stormer Viscosimeter
D 570	Standard Test Method for Water Absorption of Plastics
D 638	Standard Test Method for Tensile Properties of Plastics
D 711	Standard Test Method for No-Pick-Up Time of Traffic Paint
D 768	Standard Specification for Yellow Iron Oxide
D 868	Standard Test Method for Evaluating Degree of Bleeding of Traffic Paint
D 1152	Standard Specification for Methanol (Methyl Alcohol)
D 1155	Standard Test Method for Roundness of Glass Spheres
D 1199	Standard Specification for Calcium Carbonate Pigments
D 1210	Standard Test Method for Fineness of Dispersion of Pigment-Vehicle Systems by Hegman-Type Gage
D 1214	Standard Test Method for Sieve Analysis of Glass Spheres
D 1475	Standard test Method for Density of Paint, Varnish, Lacquer, and Related Products
D 2240	Standard Test Method for Rubber Property-Durometer Hardness
D 2243	Standard Test Method for Freeze-Thaw Resistance of Waterborne Coatings
D 2369	Standard Test Method for Volatile Content of Coatings
D 2805	Standard Test Method for Hiding Power of Paints by Reflectometry
D 3723	Standard Test Method for Pigment Content of Water Emulsion by Low Temperature Ashing
D 3960	Standard Practice for Determining Volatile Organic Content (VOC) of Paints and Related Coatings
D 4060	Standard Test Method for Abrasion Resistance of Organic Coatings by Taber Abraser
D 4061	Standard Test Method for Retroreflectance of Horizontal Coating
D 4366	Standard Test Methods for Hardness of Organic Coatings by Pendulum Damping Tests
D 4796	Standard Test Method for Bond Strength of Thermoplastic Traffic Marking Material
D 5420	Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact)
E 70	Standard Test Method for pH of Aqueous Solutions With the Glass Electrode
E 303	Standard Test Method for Measuring Surface Frictional Properties Using the British Pendulum Tester
E 308	Standard Practice for Computing the Colors of Objects by Using the CIE System
E 660	Standard Practice for Accelerated Polishing of Aggregates or Pavement Surfaces Using a Small-Wheel, Circular Track Polishing Machine
E 1347	Standard Test Method for Color and Color-Difference Measurement by Tristimulus (Filter) Colorimetry
E 1349	Standard Test Method for Reflectance Factor and Color by Spectrophotometry Using Bidirectional Geometry

AASHTO

- M 247 Standard Specification for Glass Beads Used in Pavement Markings
- M 249 Standard Specification for White and Yellow Reflective Thermoplastic Striping Material (Solid Form)
- T 250 Standard Method of Test for Thermoplastic Traffic Line Material

Manual of Uniform Traffic Control Devices, latest Edition (MUTCD)

ACI

Federal Test Method Standard No. 141d, Method 4252 – Paint, Varnish, Lacquer and Related Materials; Methods of Inspection, Sampling and Testing

Federal Test Method Standard No. 141d, Method 6242 – Paint, Varnish, Lacquer and Related Materials; Methods of Inspection, Sampling and Testing

Federal Standard 595, Colors used in Government Procurement

Federal Specification TT-P-115a – Paint, Traffic (Highway, White and Yellow)

Federal Specification TT-P-1952B – Paint, Traffic and Airfield Marking, Water Emulsion Base

“Standard Color Chips for Highway Signs” (US Bureau of Public Roads, Washington D.C.)

KDOT Standard Specifications Section 2214.2.a(2)(d) Bond Strength

National Board of Fire Underwriters of the National Fire Protection Association Standards

2306.3 General

The permanent pavement markings shall be installed immediately after the roadway surface is complete unless prior approval is received by the Engineer. The installation of the yellow markings (as required) is the first priority. If the permanent markings cannot be installed and thus the roadway would be unmarked overnight, temporary removable markings shall be installed and remain until the permanent markings can be installed. The contractor shall make every possible effort to remove the temporary pavement markings and install permanent pavement markings within 48 hours. Only under extreme circumstances and with the approval of the Engineer, will the duration of the temporary pavement markings be extended. Under no circumstance should the temporary pavement markings be in place for more than 2 weeks. If permanent markings cannot be installed within the specified time then semi-permanent markings shall be installed following the guidelines as set forth in the latest edition of the Manual on Uniform Traffic Control Devices (MUTCD) Part VI, Sections F6 and G6. The temporary removable markings shall be removed prior to installation of the permanent markings. In situations where markings conflict with the traffic routing, such as a lane closure or a lane diversion, conflicting markings shall be removed prior to application of the next set of markings.

2306.4 Striping Applicability Chart

These charts provide guidance for the selection of striping materials:

Marking Material	Roadway Surface	Application	Durability
Thermoplastic	New asphalt	Permanent	High
Aggressive bond thermoplastic	Aged asphalt	Permanent	High
Preformed thermoplastic	Asphalt, concrete	Permanent	High
Cold plastic	Asphalt, concrete	Permanent	Moderate
Paint	All surfaces	Permanent, temporary	Low
Epoxy	All surfaces	Permanent	High
Temporary Tape (Type I)	All surfaces	Temporary	Low
Temporary Tape (Type II)	All surfaces	Temporary	Low
Line masking tape	All surfaces	Temporary	Low

Roadway Surface	Permanent Marking	Temporary Marking
New asphalt	Thermoplastic	Temporary Tape (I or II)
Old asphalt	Aggressive bond thermoplastic	Temporary Tape (I or II)
Slurry or microsurface	Thermoplastic	Temporary Tape (I or II)
Milled concrete or asphalt	Not applicable	Paint
Asphalt to be milled	Not applicable	Paint
Base asphalt	Not applicable	Paint, Temporary Tape (Type II)
New or old concrete	Aggressive bond thermoplastic, Epoxy	Paint
Concrete	Inlaid cold plastic	Paint
Diamond ground concrete	Epoxy	Paint

Note: Old asphalt is asphalt which is more than 6 months old, or which has been open to traffic.

2306.5 Symbol Applicability Charts

These charts provide guidance for the selection of text and non-text symbol materials:

Roadway Surface	Text Symbols	Temporary Text Symbols
New asphalt	Pre-formed thermoplastic	Temporary Tape (I or II)
Old asphalt	Pre-formed thermoplastic	Temporary Tape (I or II), paint
Slurry or microsurface	Pre-formed thermoplastic	Temporary Tape (I or II), paint
Milled concrete or asphalt	Not applicable	Paint
Asphalt to be milled	Not applicable	Paint
Base asphalt	Not applicable	Paint
New or old concrete	Inlaid cold plastic	Temporary Tape (I or II)
Concrete	Inlaid cold plastic	Temporary Tape (I or II)
Diamond ground concrete	Inlaid cold plastic	Temporary Tape (I or II)

2306.6 Prequalification

Refer to KDOT's "Index of Prequalified Materials and Material Sources" for a list of approved pavement marking materials.

2306.7 Materials

A. Pre-Mix Glass Spheres: Pre-mix glass spheres shall be uncoated and conform to AASHTO M 247 Type 1. The glass spheres used in the formulation shall be lustrous, free from film, scratches, and pits. The glass spheres shall also meet the following requirements:

1. Roundness: The roundness of the spheres shall be a minimum of 70% when tested in accordance with ASTM D 1155.
2. Gradation: The gradation when tested in accordance with the method provided in ASTM D 1214 (by use of U.S. Standard Sieves) shall be:

Size of Sieve	Mass % Passing
No. 18	80 – 100
No. 50	20 – 50
No. 80	0 – 10

3. Refractive Index: When tested by a liquid immersion method at 77° F, the refractive index of the spheres shall be a minimum of 1.50.

- B. Drop-On Glass Spheres: The spheres shall be manufactured from glass of a composition designed to be highly resistant to traffic wear and to the effects of weathering. The particles shall be spherical in shape, containing not more than thirty percent (30%) of irregularly shaped particles. They shall be essentially free of sharp angular particles, and particles showing milkiness or surface scoring or scratching. They shall meet the requirements of AASHTO M 247 Type 1.

1. Gradation: The gradation when tested in accordance with the method provided in ASTM D 1214 (by use of U.S. Standard Sieves) shall be:

Size of Sieve	% Passing (by Weight)
No. 20	100
No. 30	80 – 100
No. 50	18 – 35
No. 80	0 – 10
No. 100	0 – 2

2. Refractive Index: When tested by a liquid immersion method at 77° F, the refractive index of the spheres shall be within the range of 1.50 to 1.60.
 3. Moisture Proof Requirements: The spheres shall show no tendency to absorb moisture in storage and shall remain free of clusters and hard lumps. The spheres shall flow freely from dispensing equipment at any time when surface and atmospheric conditions are satisfactory for application.
- C. Thermoplastic Pavement Markings: This specification covers a white and yellow thermoplastic reflectorized pavement marking material of a type that is applied to asphalt road surfaces in a molten state by mechanical means to receive a surface application of glass spheres, and which upon cooling to normal pavement temperature, produces an adherent reflectorized stripe of specified thickness and width and is capable of resisting deformation.

1. Characteristics: The material shall not exude fumes that are toxic, obnoxious or injurious to person or property, when it is heated to the temperature range specified by the manufacturer for application. It shall remain stable when held for 4 hours at this temperature, or when subject to three reheatings after cooling to ambient temperature.

The temperature-viscosity characteristics of the plastic material shall remain constant throughout repeated reheatings, and shall show like characteristics from batch to batch. There shall be no obvious change in color of the material either as a result of repeated reheatings or from batch to batch.

The thermoplastic material shall easily extrude from the equipment to produce a cross-section of line 90 to 125 mil thick, which shall be continuous and uniform in shape, and have clear and sharp dimensions.

2. Serviceability: The compound shall resist deterioration by contact with sodium chloride, calcium chloride or other chemicals used to prevent roadway ice, or because of the oil content of pavement materials or from oil droppings or other effects of traffic. The markings shall remain intact under normal traffic conditions at temperatures below 140° F.
3. Specific Gravity: The material's specific gravity shall not be less than 1.8 nor exceed 2.3 referred to water at 77° F when determined by a water displacement method at 77° F.
4. Set Time: When applied at the specified temperature and thickness, the material shall set to bear

traffic in not more than 2 minutes when the air temperature is 50° F and not more than 10 minutes when the air temperature is 90° F.

5. Composition: The thermoplastic pavement marking material shall be homogeneously composed of pigment, filler, resin binder and glass reflectorizing spheres. The solid resin shall be a "maleic–modified glycerol ester resin" (alkyd binder) comprising at least one–third of the binder compositions and be no less than eight percent (8%) by weight of the entire material formulation. The alkyd binder shall consist of a mixture of synthetic resins (at least one of which is solid at room temperature), and high boiling point plasticizers. The material shall not contain any petroleum derived ingredients. Yellow pigment shall be heat stabilized encapsulated lead chromate. The thermoplastic pavement marking material shall contain the following ingredients:

INGREDIENT (Percent by Weight)	WHITE	YELLOW
Binder	18.0 min.	18.0 min.
Titanium Dioxide	10.0 min.	-----
Glass Spheres	20.0 – 50.0	20.0 – 50.0
Lead Chromate	-----	2.0 – 4.5
Inert Fillers	42.0 max.	50.0 max.

The material shall be thoroughly mixed and furnished in a free flowing granular form. The material shall meet the requirements of this specification for a period of one year. The material shall readily melt in a uniform mixture. The material shall be free from all skins, dirt, and foreign objects. It shall be of such composition that it will not bleed, stain or discolor when applied to bituminous pavement. The manufacturer shall replace material not meeting the above requirements.

6. Color: The color of the thermoplastic material after heating for 4 hours $\pm$ 5 minutes at 425 $\pm$ 3° F shall conform to the following when tested by Federal Test Method Standard 141 Method 4252:

White	Federal Color Chip No. 17875 (Fed. Std. No. 595)
Yellow	Federal Color Chip No. 13538 (Fed. Std. No. 595)

7. Reflectance: The daylight luminous reflectance of the white material shall be not less than 75% when tested according to ASTM E 1347. The yellow shall have a minimum brightness of 45% relative to magnesium oxide, and shall be within the green and red tolerance of the "Standard Color Chips for Highway Signs (January 1939)" obtainable from the United States Bureau of Public Roads, Washington, D.C. (TT–P–115a).
8. Softening Point: After heating the thermoplastic material for 4 hours + 5 minutes at 425 $\pm$ 3° F and testing in accordance with ASTM D 36, the material shall have a softening point 215 $\pm$ 15° F.
9. Flowability: After heating the thermoplastic material for 4 hours $\pm$ 5 minutes at 425 $\pm$ 3° F and testing for flowability, the white thermoplastic shall have a maximum percent residue of 18% and the yellow thermoplastic shall have a maximum residue of 21%.

After heating the thermoplastic material for 8.5 hours $\pm$ 5 minutes at 425 $\pm$ 3° F and testing for flowability, the thermoplastic shall have a maximum percent residue of 28%.

10. Indentation Resistance: Hardness shall be measured by a Shore Durometer, Type A2, as described in ASTM D 2240, except that the Durometer and the panel shall be at 77° F, and a 4.4 lb load applied. After 15 seconds, the reading shall be not less than 55.

11. Abrasion Resistance: The material shall not show a maximum loss of 0.02 ounces subjected to 200 revolutions on a Taber Abraser at 77° F, using H-22 calibrate wheels, weighted to 17.6 ounces. The wearing surface should be kept wet with distilled water throughout the test. The panel for this test shall be prepared by forming a representative lot of material at a thickness of 125 mil on a 4-inch square panel (thickness 0.050 + 0.001 inch) on which a suitable primer has been previously applied.
 12. Low Temperature Impact Resistance: The materials shall not fracture when subjected to an impact of 64 inch pounds at -4° F, for at least 3 hours. The panel is then placed in an instrument also maintained at -4° F, consisting of a 10.5 pound freely falling weight controlled to drop vertically for 6-inches onto the surface of the panel, which it strikes with a hemispherical indenter having a radius of 0.28-inches.
 13. Water Absorption: Materials shall have a maximum of 0.5 percent by weight of retained water when tested by ASTM D 570, procedure (A).
 14. Yellowness Index: The white thermoplastic material shall not exceed a yellowness index of 0.15.
 15. Flash Point: The thermoplastic material shall have a flash point not less than 475° F when tested in accordance with ASTM D 92.
 16. Cracking Resistance: After heating the thermoplastic material for 4 hours + 5 minutes at 425 ± 3° F; applying to concrete blocks, and cooling 15 ± 3° F, the material shall show no cracks. Properly applied, the material shall show less than six stress cracks per ten lineal feet of markings independent of pavement fracturing and faulting, for at least six months.
- D. Aggressive Bond Thermoplastic Pavement Markings: This specification covers a white and yellow adhesive thermoplastic reflectorized pavement marking material that is applied to road surfaces, including Portland Cement Concrete (PCC) and aged asphalt without need of a primer/sealer. The material is applied to the road surface in a molten state by mechanical means with surface application of glass beads. Upon cooling to normal pavement temperature, it produces an adherent reflectorized stripe of specified thickness and width with limited thermal/seasonal deformation. In order to qualify as a non-sealer thermoplastic that can be applied to concrete surfaces without a sealer, the material must meet or exceed the requirements listed below.
1. Characteristics: The thermoplastic material shall be homogeneously composed of pigments, resins, polymers (adhesive constituent), glass reflectorizing spheres and other fillers. The thermoplastic material shall be available in a variety of surface delineation colors from the same manufacturer. The manufacturer shall have the option of formulating the material according to their own specifications.

However, certain physical and chemical requirements specified must be satisfied in order to qualify as a non-primed striping application for PCC and aged asphalt surfaces.

The material shall not exude fumes which are toxic or injurious to persons or properties upon heating to application temperature.
 2. Specific Gravity: The specific gravity of the white and yellow thermoplastic pavement marking material shall not exceed 2.15.
 3. Composition: The pigment, intermix reflectorizing spheres, and fillers shall be uniformly dispersed in the resin and polymer upon heating to application temperature. The material shall be free of dirt and foreign matter and must meet or exceed the compositional requirements (percentage by weight) indicated below. The total resin/binder content must be 22% min. – 26% max. (weight) of total product ingredients.

Test Component	White	Yellow (Lead Chromate)	Yellow (Heavy Metal Free)
Glass Beads	30% min.	30% min.	30% min.
Pigment – TiO ₂	10% min.	N/A	N/A
Yellow (PbCrO ₃)	N/A	2% min.	Federal Color
Resin/Binder Content	22% min.	22% min.	22% min.
Inert Fillers	42.0 max.	50.0 max.	At manufacturer's discretion

4. Color: The thermoplastic material after heating for four hours $\pm$ 5 min. at $425 \pm 3^\circ$ F and cooled to $77 \pm 3^\circ$ F shall meet the following:

White	Daylight reflectance at $45^\circ - 0^\circ - 80\%$ min.
Yellow	Daylight reflectance at $45^\circ - 0^\circ - 45\%$ min.

Yellow color shall match Federal Test Standard Number 5958 – Color 13538 and lie within the following ranges:

X	0.485 – 0.510
Y	0.445 – 0.470

The chromaticities and luminance factors of ordinary colors of retroreflecting material shall be determined under an angle of illumination of 45 degrees; direction of view perpendicular to surface; and illumination CIE standard illuminant D65.

5. Bond Strength: After heating the thermoplastic material for four hours $\pm$ 5 minutes at $425 \pm 3^\circ$ F, the bond strength to Portland Cement Concrete (PCC) shall equal or exceed 275 psi (ASTM Standard Test Method for Bond Strength of Thermoplastic Traffic Marking Materials – D 4796 or ASTM C 321). Failures of type described in Section 6.1 of ASTM D 4796 bond test, must be repeated to obtain a quantifiable number. Failure of types 6.2, 6.3, and 6.4 of ASTM D 4796 bond test, must exceed the specified thermoplastic – cement brick separation.
6. Low Temperatures Cracking (Stress) Resistance for Extended Period: The material shall be tested according to AASHTO T 250 Section 7 with Section 7.2.3, modified for an extended cold temperature of $15 \pm 3^\circ$ F exposure period of 72 hours. Any cracking shall constitute failure of the material to qualify as a non-sealer aggressive bonding material for PCC road surfaces.
7. Impact Resistance (Gardner Falling Weight): The test specimens should be formed according to the following procedure:

Heat approximately 14.1 ounces of material in an open pint can for 4 hours at $425 \pm 3^\circ$ F. Preheat specimen draw down blade, 2-inches x 4-inches with a 1/8-inch die opening for approximately one hour at $425 \pm 3^\circ$ F. The blade is usually placed in the oven containing the sample material during the last hour of sample heating.

After heating the sample for four hours, remove the sample and the draw down blade from the oven. Place the 125-mil blade onto a PCC block. Quickly pour the sample $425 \pm 3^\circ$ F into the opening of the

draw down screed and draw down the sample for the entire length of the concrete block. Allow the drawn down test sample to condition in the open in the standard laboratory atmosphere, $73.4 \pm 3^{\circ}\text{F}$ and $50 \pm 5\%$ relative humidity.

Perform the testing procedure according to ASTM D 5420 Section 11. Record and report the type of failure as (a) crack or cracks on the surface, (b) cracks that penetrate the entire thickness, (c) brittle shatter (the test specimen in several pieces after impact), or (d) ductile failure (the specimen is penetrated by a blunt tear).

Both the yellow and white non-sealer materials shall have minimum impact resistance of 80 inch pounds with no visible surface cracks.

8. Impact Resistance (Notched Izod): After heating the material for four hours $\pm$ 5 minutes at $425 \pm 3^{\circ}\text{F}$ and forming test specimens according to AASHTO T 250 Section 8, both the yellow and white samples shall be a minimum notched impact resistance of 11.0 ± 0.3 inch pounds. The specimens shall be tested both at room temperature $73.4 \pm 3^{\circ}\text{F}$ and low temperature of $15 \pm 3^{\circ}\text{F}$ in accordance with ASTM D 256 test method A.
9. Oil and Grease Resistance: The thermoplastic material shall show no signs of deterioration or solubility after motor oil is rubbed vigorously into a sample for 2 minutes and allowed to penetrate for 5 minutes.
10. Set Time: When applied at a temperature range of $412.5 \pm 12.5^{\circ}\text{F}$ and thickness of 90 to 125 mil the material shall set to bear traffic in not more than 2-minutes when the air temperature is $50 \pm 3^{\circ}\text{F}$ and not more than ten minutes when the air temperature is $90 \pm 3^{\circ}\text{F}$.
11. Flash Point: The thermoplastic material shall have a flash point of not less than 500°F when tested in accordance with ASTM D 92.
12. Storage Life: The material shall maintain the requirements of this specification for a minimum period of one year. The thermoplastic material must melt uniformly with no evidence of skins or unmelted particles for this one year time period. Any material failing to do so shall be replaced by the manufacturer at their expense.
13. Packaging and Marking: The thermoplastic material shall be packaged in suitable containers to which it will not adhere during shipment and storage. The container of thermoplastic material shall weigh approximately 50 lbs. Each container shall designate user information, manufacturer's name and address, batch number and date of manufacture. Each batch manufactured shall have its own separate number. The label shall carry appropriate user warnings and instructions.
14. NTPEP Test Program: The material must have been applied, without surface primer, on two NTPEP

Decks (PCC) and evaluated for a period of at least one year. A minimum of 90% of the original pavement striping must be intact on the PCC decks after a one-year review period. The percent retention is calculated based on the measured test area square footage (neglecting mil thickness wear down) minus the road surface areas that are exposed due to cracking and chipping away of thermoplastic from the concrete surface caused by product bond failure to the substrate.

- E. Preformed Thermoplastic Pavement Markings: This specification is for the furnishing of retroreflective preformed thermoplastic pavement marking materials that can be adhered to asphalt, concrete and Portland cement concrete pavements by means of heat fusion. The applied markings shall be very durable, oil and grease impervious and provide immediate and continuing retroreflectivity.

1. Characteristics: The preformed marking material shall consist of a resilient white and yellow polymer

thermoplastic with uniformly distributed glass beads throughout its entire cross section.

Preformed words and symbols shall conform to the applicable shapes and sizes as prescribed in the latest revision of the Manual on Uniform Traffic Control Devices (MUTCD).

The preformed markings shall be fusible to asphalt concrete and Portland cement concrete pavements by means of the normal heat of a propane type of torch. Adhesives, primers or sealers shall not be used prior to the preformed marking application on asphalt concrete and Portland cement concrete pavements.

The preformed markings shall conform to pavement contours, breaks and faults through the action of traffic at normal pavement temperatures. The markings shall have resealing characteristics and be capable of fusing to itself and previously applied worn hydrocarbon and/or alkyd thermoplastic pavement markings.

The preformed markings shall be capable of application on new, dense and open graded asphalt concrete wearing courses during the paving operation in accordance with the manufacturer's instructions. After application, the markings shall be immediately ready for traffic. The preformed markings shall be suitable for use for one year after the date of receipt when stored in accordance with the manufacturer's recommendations.

The preformed thermoplastic markings shall not be brittle and must be sufficiently cohesive and flexible at temperatures exceeding 50 degrees F for one person to carry without the danger of fracturing the material prior to application.

2. Composition: The retroreflective pliant polymer thermoplastic pavement markings shall consist of a homogeneous mixture of high quality polymeric thermoplastic binders, pigments, fillers and glass beads. The thermoplastic material must conform to AASHTO designation M 249 with the exception of the relevant differences due to the material being supplied in a preformed state.
3. Glass Beads: The markings shall contain 30% glass spheres which shall conform to AASHTO M 247 Type 1, except that glass spheres shall have a minimum of 70% true spheres on each sieve and 80% true spheres overall.

The glass beads must be homogeneously blended throughout the material with a securely bonded protruding exposed layer of beads that provide immediate and continuous retroreflectivity; no additional glass beads shall be dropped on the material during application. Curved arrows must be available without protruding glass beads if reversibility is needed.

4. Retroreflectivity: The preformed marking shall upon application exhibit uniform adequate nighttime retroreflectivity when tested in accordance with ASTM E 1710. At 86 degree 30 feet incidence angle and 1 degree 30-feet divergence angle, the markings shall have average minimum intensities of 350 millicandelas for white and 175 millicandelas for yellow as measured with a MiroLux or LTL-2000 retroreflectometer. Follow manufacturer's instructions for use.

Using a Taber Abraser with an H-18 wheel and a 4.4 ounce load, the sample shall be inspected at 200 cycles, under a microscope, to observe the extent and type of bead failure. No more than 15% of the beads shall be lost due to popout and the predominant mode of failure shall be "wear down" of the beads.

5. Color Characteristics: The thermoplastic material without glass beads shall meet the following:

White	Daylight reflectance at 45° / 0° of 80% min.
Yellow	Daylight reflectance at 45° / 0° of 45% min.

The daylight reflectance shall not change significantly when the preformed thermoplastic is properly applied to the roadway surface.

For highway use, the white markings shall contain a minimum of 8% by weight of Titanium Dioxide pigment to ensure a color similar to Federal Highway White, Color No. 17886 Standard 595. Yellow color shall reasonably match color chip Number 13538 of Federal Standard 595 and be lead free.

6. Skid Resistance: The surface of the preformed thermoplastic markings shall provide a minimum skid resistance value of 45 BPN when tested according to ASTM E 303.
 7. Thickness: The width of the supplied material shall have a minimum average thickness of 90 mils.
 8. Flexibility: The preformed thermoplastic marking material shall have flexibility at 50° F such that no cracking occurs in the test sample when a 1-inch by 6-inches sample is bent through an arc of 900 at a uniform rate in 10 seconds (9 seconds per degree) over a one inch mandrel. The sample must be conditioned prior to testing at 50 ± 2° F for a minimum of four hours. At least two specimens tested must meet the flexibility requirements at 50° F for a passing result.
 9. Environmental Resistance: The applied markings shall be resistant to deterioration due to exposure to sunlight, water, oil, diesel fuels, gasoline, pavement oil content, salt, and adverse weather conditions.
 10. Effective Performance Life: When properly applied, in accordance with the manufacturer's instructions, the pavement markings shall be neat and durable. The markings shall remain retroreflective and show no fading, lifting, shrinkage, tearing, roll back or other signs of poor adhesion.
- F. Cold Plastic Pavement Markings: This specification covers a white and yellow pre-formed cold plastic reflectorized pavement marking material of a type that is applied to a road surface by an inlaid, pre-coated pressure sensitive adhesive that produces an adherent reflectorized stripe of specified thickness and width and is capable of resisting deformation.
1. Characteristics: The material shall be manufactured without the use of lead-chromate pigments or other, similar, lead-containing chemicals.
- Glass beads shall be incorporated to provide immediate and continuing retroreflection. Ceramic skid particles shall be bonded to the top layer to provide a skid-resistant surface.
- Preformed word and symbol markings shall conform to the applicable shapes and sizes as outlined in the Manual on Uniform Traffic Control Devices (MUTCD).
- The preformed markings shall be capable of being adhered to pavements by an inlaid, pre-coated pressure sensitive adhesive. A surface preparation adhesive may be used to precondition the inlay pavement surface.
- The preformed marking film shall mold itself to pavement contours by the action of traffic. Following proper inlay application and tamping, the markings shall be immediately ready for traffic.
2. Composition: The retroreflective pavement marking film shall consist of a mixture of high-quality polymeric materials, pigments and glass beads distributed throughout its base cross-sectional area. A reflective layer of glass beads and a layer of skid-resistant ceramic particles shall be bonded to the top urethane wearing surface. The urethane wear surface shall have a nominal thickness of 5 mil (0.005

inches). The film shall have a pre-coated, shear-resistant, pressure sensitive adhesive.

3. Color: The daytime color of the white film shall provide a minimum initial luminance factor, Y, of 80 and shall conform to the following chromaticity requirements:

WHITE		YELLOW	
X Values	Y Values	X Values	Y Values
0.290	0.315	0.474	0.455
0.310	0.295	0.491	0.435
0.330	0.360	0.512	0.486
0.350	0.340	0.536	0.463

The daytime color of the yellow film shall provide an initial luminance factor, Y, in a range of 36 to 59 and shall conform to the above chromaticity requirements:

Measurements shall be made in accordance with ASTM E 1349, using illuminant "C" and 0/45 (45/0) geometry. Calculations shall be in accordance with ASTM E 308 for the 2-degree observer.

4. Reflectance: The white and yellow films shall have the following initial minimum reflectance values as measured in accordance with the testing procedures of ASTM D 4061. The photometric quantity to be measured shall be coefficient of retroreflected luminance (RL) and shall be expressed as millicandelas per square foot per foot-candle (mcd-ft⁻²-fc⁻¹).

	WHITE			YELLOW		
Entrance Angle	86.0°	86.0°	86.5°	86.0°	86.0°	86.5°
Observation Angle	0.2°	0.5°	1.0°	0.2°	0.5°	1.0°
Retroreflected Luminance R _L (mcd-ft ⁻² -fc ⁻¹)	700	500	400	410	250	175

5. Skid Resistance: The surface of the retroreflective films shall provide an initial minimum skid resistance value of 55 BPN as measured by the British Portable Skid Tester in accordance with ASTM E 303.

The surface of the retroreflective film shall retain an average skid resistance value of 45 BPN, when tested in accordance with ASTM E 303, for a period of one year when installed in non-snow removal areas. The 45 BPN minimum value shall be an average of several readings taken in both the wheel

track and non-wheel track areas.

6. Tensile Strength and Elongation: The film shall have a minimum tensile strength of 150 lbs. per square inch of cross-section when measured in the direction of the length of the roll and tested in accordance to ASTM D 638, except that a sample 6 inch x 1 inch shall be tested at a temperature between 70° F and 80° F using a jaw speed of 10 to 12 inches per minute. The sample shall have a maximum elongation of 50% at break when tested by this method.
7. Reflectivity Retention: The glass beads must be strongly bonded and not be easily removed by traffic wear. Using a Taber Abraser with an H-18 wheel and a 4.4 ounce load, the sample shall be inspected at 200 cycles, under a microscope, to observe the extent and type of bead failure. No more than 15% of the beads shall be lost due to popout and the predominant mode of failure shall be "wear down" of the beads.

8. Glass Beads: The size, quality and refractive index of the glass beads shall be such that the performance requirements for the markings shall be met. The bead adhesion shall be such that beads are not easily removed when the material surface is scratched. The film shall have glass bead retention qualities such that when a 2-inches by 6-inches sample is bent over a 1/2-inch diameter mandrel, with the 2-inch dimension perpendicular to the mandrel axis, microscopic examination of the area on the mandrel shall show no more than 10% of the beads with entrapment by the binder of less than 40%.
 9. Thickness: The film, without adhesive, shall have a minimum thickness of 60 mil.
- G. Lead-Free, Water-Borne Emulsion Based White and Yellow Traffic Paint: The pavement marking paint shall be rapid dry. The traffic paint shall provide optimum adhesion for glass spheres when both binder and glass spheres are applied in the recommended quantities.

1. Drying Time: When applied at a wet film thickness of 15 mils with a top dressing of 6–10 pounds of glass spheres per gallon of paint and when the pavement temperature is between 50° F and 120° F and the relative humidity doesn't exceed 80%, the binder shall dry to a no-tracking condition in a minimum of 20 seconds and a maximum of 60 seconds.

These dry times shall not be exceeded when the paint is applied with specialized equipment so as to have the pigmented binder at a temperature of 150° F to 170° F at the spray gun.

The no-tracking condition shall be determined by passing over the applied line in a simulated passing maneuver with a passenger car traveling 35 MPH. There shall be no visual deposition of the paint to the pavement surface when viewed from a distance of 50 feet. Furthermore, the pigmented binder, without glass spheres, shall dry to no-tracking condition in 180 seconds or less when tested in accordance with ASTM D 711.

2. Directional Reflectance: The daylight directional reflectance of white pigmented binder (without glass spheres) shall be not less than 85% relative to magnesium oxide when tested in accordance with Federal Test Method Standard No. 141d, Method 6242. If yellow, after drying shall suitably match color 13538 of Federal Standard 595.
3. The paint for the pavement markings shall contain no lead and/or chromium and shall have volatile organic content conforming to the latest Environmental Protection Agency regulations.
4. In addition, the paint and/or components shall conform to the American Society for Testing Materials

(ASTM) as follows:

D 93	Standard Test Methods for Flash Point by Pensky Martens Closed Tester
D 476	Standard Specification for Titanium Dioxide Pigments, Type II Rutile
D 562	Standard Test Method for Consistency of Paints Using Stormer Viscosimeter
D 711	Standard Test Method for No-Pick-Up Time of Traffic Paint
D 768	Standard Specification for Yellow Iron Oxide
D 868	Standard Test Method for Evaluating Degree of Bleeding of Traffic Paint
D 1152	Standard Specification for Methanol (Methyl Alcohol)
D 1199	Standard Specification for Calcium Carbonate Pigments
D 1210	Standard Test Method for Fineness of Dispersion of Pigment-Vehicle Systems by Hegman-Type Gage
D 1475	Standard test Method for Density of Paint, Varnish, Lacquer, and Related Products
D 2243	Standard Test Method for Freeze-Thaw Resistance of Waterborne Coatings
D 2369	Standard Test Method for Volatile Content of Coatings

D 2805	Standard Test Method for Hiding Power of Paints by Reflectometry
D 3723	Standard Test Method for Pigment Content of Water Emulsion by Low Temperature Ashing
D 3960	Standard Practice for Determining Volatile Organic Content (VOC) of Paints and Related Coatings
D 4060	Standard Test Method for Abrasion Resistance of Organic Coatings by Taber Abraser
D 4366	Standard Test Methods for Hardness of Organic Coatings by Pendulum Damping Tests
E 70	Standard Test Method for pH of Aqueous Solutions With the Glass Electrode
E 1347	Standard Test Method for Color and Color-Difference Measurement by Tristimulus (Filter) Colorimetry

The paint shall show no cracking, flaking, blistering, appreciable loss of adhesion, softening, coagulation, discoloration, and have a minimum bleeding ratio of 0.97 when tested in accordance with Federal Specification TT-P-1952B.

The paint shall be capable of dilution with water at all levels without curdling or precipitation such that the wet paint can be readily cleaned up with water only.

The minimum contrast ratio shall be 0.96 when drawing down with a 0.005 bird film applicator on a 2A Leneta Chart or equal and air-dried for 24 hours.

Contrast Ratio = Black/White.

- H. Temporary Tape: This specification covers pavement marking tape of two colors, white and yellow, and of two types, Type I and Type II.

Type I Regular (This type is not required to be easily removable intact)

Type II Removable (This type is to be readily removable intact, either manually or with a roll-up device after having been in place through the construction season)

1. General: This material shall be a pavement striping tape designed to provide reflective delineation under both dry and moderate rainfall conditions. The tape shall consist of glass spheres tightly embedded to a binder; on a conformable backing pre-coated with a pressure sensitive adhesive. The striping material shall be thin, flexible, formable, and following application shall remain conformed to the texture of the pavement surface. The tape shall be furnished in the color and type designated on the Plans or in the Contract Documents. The markings shall be pre-coated with a pressure sensitive adhesive and shall be capable of being adhered to asphalt concrete or Portland cement concrete in accordance with manufacturer's instructions without the use of heat, solvents or other additional adhesive means, and shall be immediately ready for traffic after application. The adhesive shall not require a liner or release paper. The striping material shall have a uniform appearance, free from cracks and the edges shall be true, straight and unbroken. The material shall be weather resistant and show no appreciable fading, lifting or shrinkage when applied in accordance with the manufacturer's recommendations.
2. Color and Daylight Reflectance: The daylight reflectance (ASTM E 1347) of white shall be not less than 70%. The color of yellow shall be within the red and green tolerance limits of the Highway Yellow Color Tolerance Chart issued by the U.S. Department of Transportation.
3. Dimensions: The width and length shall be as shown on the Plans or in the Contract Documents. The material shall be available in rolls and there shall be no more than three splices per 50 yards of length.
4. Packaging: The material shall be packaged in accordance with accepted commercial standards and when stored under normal conditions, shall be suitable for use for a period of at least one year after

purchase.

5. Adhesion: The material shall adhere to asphalt and concrete surfaces when applied according to manufacturer's recommendations at surface temperatures above 50° F and shall be immediately ready for traffic following application.
 6. Removability: Type II tape shall be removable from asphalt and Portland cement concrete intact or in large pieces, either manually or with a roll-up device, at temperatures above 40° F without use of heat, solvents, grinding or blasting.
 7. Reflection: The white and yellow material shall be retroreflective, reflecting white or yellow respectively and shall be readily visible at night when viewed with automobile headlamps using high beams from a distance of at least 300 feet.
 8. Durability: Type II material shall maintain adhesion, show no alligating, show no signs of pulling apart, and shall suffer no more than a 25% loss of beads, sand and grit when subjected to 30,000 revolutions on a small-wheel circular track as described in ASTM E 660, with the following variations or exceptions:
 - a. Two opposite wheels mounted with Goodyear 3.40-5 NHS Industrial Rib tires shall be used with a total load of 51.5 pounds on each tire. Tire air pressure shall be maintained at 25 pounds. The wheels shall be mounted perpendicular to the specimens and toed out 20 to produce a slight abrading action.
 - b. Specimens shall be applied to 6-inch diameter dense graded bituminous concrete surface which has been compacted at 3,000 psi for two minutes. After application, the specimens shall be allowed to cure at least 16 hours before beginning the test.
- I. Epoxy: This specification is for the application of epoxy resin and glass beads as reflective pavement markings on Portland cement concrete or bituminous pavements. The epoxy resin material shall be toxic heavy metal free, two-component, 100% solids, and shall be formulated and tested to perform as a pavement marking material with glass spheres applied to the surface. The two components are an epoxy resin and an amine curing agent. The Contractor shall provide complete manufacturer's specifications and material safety data sheets to the Engineer for all material furnished.
1. Characteristics: The material shall not exude toxic fumes when heated to application temperature. The material which, when mixed in the proper ratio and applied at 0.14 mil wet film thickness at 74.8° F with the proper saturation of glass beads, has a no-tracking time of less than 40 minutes for slow curing material and less than 10 minutes for rapid curing material. The material shall be capable of fully curing under a constant surface temperature of 32° F or above.
 2. Properties of Cured Material
 - a. Color: Provide white which complies with Federal Standard 595 17875. Provide yellow which matches the standard shade within the red and green tolerance limits when compared with the Highway Yellow Color Tolerance chart available from the U.S. Department of Transportation, Washington, D.C. (Federal Standard 595, 13538).
 - b. Abrasion Resistance: 0.0028 ounces maximum loss when tested at 30 ± 1.5 mils and a 72 hour cure and with a CS-17 wheel under a load of 2.2 lbs. for 1000 cycles.
 - c. Hardness: Shore D hardness of 75 minimum.
 - d. Adhesion to Concrete: When catalyzed, has such a high degree of adhesion to the specified concrete surface that there is a 100% concrete failure. Apply the material at a film thickness of 15 ± 1.5 mils to concrete with a minimum compressive strength of 4,061 psi. Allow the material to cure for 72 hours at 77° F before the test is performed.

- e. Yellowness Index: White only. Value after 72 hours in QUV – 30 maximum when tested at 15 ± 1.0 mils and a 72 hour cure.
 - f. Field Evaluation: Field test materials at AASHTO NTPEP regional test facilities, which include both hot and cold weather conditions and are a minimum of six months in duration.
3. Glass Beads For Drop-On Application (double drop system)
- a. For the first drop, furnish large beads, which are compatible with the epoxy system, and comply with AASHTO M 247 except with the following gradation (FP-96, Type 4):
- | Sieve Size | Percent Passing |
|------------|-----------------|
| No. 10 | 100 |
| No. 12 | 95 – 100 |
| No. 14 | 80 – 95 |
| No. 16 | 10 – 40 |
| No. 18 | 0 – 5 |
| No. 20 | 0 – 2 |
- b. For the second drop, furnish regular beads which are specifically manufactured to be compatible with the epoxy system, and which comply with the requirements of AASHTO M 247, Type 1.
 - c. Both types of beads are to be coated with a moisture resistant coating and an adhesion promoting coating which is compatible with the epoxy system.
4. Test Methods
- a. Adhesion to Concrete - KDOT Standard Specifications Section 2214.2.a(2)(d) Bond Strength
 - b. Hardness ASTM D 2240
 - c. Abrasion Resistance ASTM C 501

2306.8 Method of Installation

The proposed permanent markings shall be laid out by the Contractor as shown on the Plans in advance of the marking installation. Markings shall not be applied until the layout and conditions of the surface have been approved by the Engineer. If a paint line is used for layout purposes (in lieu of a chalk line or string line) the paint line shall not be wider than 1/2-inch in width. If wider, the paint shall be removed following the application of the final permanent marking. New markings shall match existing markings as applicable in areas abutting existing road surfaces. The surface shall be dry and all dust, debris, oil, grease, dirt, temporary markings and other foreign matter shall be removed from the road surface prior to the application of the permanent marking material.

The Contractor shall be responsible for keeping traffic off freshly applied markings until they have set sufficiently to bear traffic. Traffic control is the responsibility of the Contractor and shall conform to the MUTCD. Failure to comply with traffic control guidelines will result in the pavement marking Contractor being directed to stop operations and leave the site until proper and approved traffic control has arrived and is put in place.

Temporary pavement markings shall be installed the same day that the existing pavement markings are damaged, removed or covered up prior to lane opening.

Temporary pavement markings shall be installed using the same cycle length as the permanent markings and be at least 2-feet long. Double yellow markings shall be used for temporary centerline and single white markings shall be used for temporary lane lines on four lane roadways. Single yellow markings shall be used for temporary centerline on two lane roadways as directed by the Engineer.

Half-cycle lengths with a minimum of 2-foot stripe and 10-foot gap should be used on roadways with severe curvature.

- A. Glass Spheres: The drop on glass beads shall be applied at a rate of eight to ten pounds per 100 square feet.
- B. Thermoplastic Pavement Markings: Thermoplastic material shall readily apply to the pavement at temperatures of 400° F to 425° F from approved equipment to produce an extruded line that shall be continuous and uniform in shape having clear and sharp dimensions. Application temperatures shall not exceed 450° F.

Thermoplastic may be used for cross walks and stop bars as specified under the conditions described herein. The thermoplastic markings shall be applied to the pavement surface in a molten state by mechanical means with surface application of glass spheres, and upon cooling to normal pavement temperature, produce an adherent retro-reflectORIZED stripe of specified thickness and width and capable of resisting deformation.

1. Equipment: The equipment used to install the thermoplastic shall be as follows:
 - a. A self-propelled machine is required in order to fulfill the timing needs of the marking installation for longitudinal lines.
 - b. If thermoplastic is used for transverse lines, i.e., crosswalks and stop lines, a push cart shall be used according to the following requirements:
 - i. Only one pass with the thermoplastic pavement marking equipment shall be allowed in order to provide the required line width according to the Plans.
 - ii. Multiple passes of narrower lines with overlaps to provide the required width shall not be allowed unless otherwise approved by the Engineer after review of a test strip installation.
 - iii. If approved, the Contractor shall be required to heat the seam with a torch and feather the overlapped material with a putty knife. Liquid thermoplastic shall not be used for word or symbol markings.
 - c. Constructed to provide mixing and agitation of the materials. Conveying parts between the main material reservoir and the shaping die shall be constructed as to prevent accumulation and clogging.
 - d. Constructed so that mixing and conveying parts up to and including the shaping die will maintain the materials at a temperature between 400° F and 450° F. To assure that the material does not fall below the minimum temperature, the shaping die shall be heated by means of a gas-fired infrared heater or a heated, oil-jacketed system.
 - e. Constructed as to insure continuous uniformity in the dimensions of the stripe. The applicator shall provide a means for cleanly cutting off square stripe ends and shall provide a method of applying "skip" lines. The equipment shall be constructed to be able to provide for varying die widths and to produce varying widths of traffic markings. The use of pans, aprons, or similar appliances with die overruns will not be permitted.
 - f. All conditions apply as stated above for material temperatures, line definition and workmanship when a hand pushcart is used for cross walks. The Engineer will verify measurement.
 - g. Equipment with a special kettle for melting and heating the material shall be provided. The kettle shall be equipped with a thermostat so that heating can be done by controlled heat transfer liquid rather than by direct flame so as to provide positive temperature control and prevent overheating of the material.
 - h. Constructed for a nominal application of 90 – 125 mil thickness.
 - i. The heater and applicator shall be so equipped and arranged as to meet the requirements of the National Board of Fire Underwriters of the National Fire Protection Association, of the state, and of the local authorities.
 - j. Equipped with an automatic glass bead dispenser attached to the striping machine in such a

manner that the beads are dispensed almost instantaneously upon the installed line. The glass bead dispenser shall be equipped with an automatic cut-off control synchronized with the cut-off of the thermoplastic material.

- k. The equipment shall be arranged as to permit preheating of the pavement immediately prior to application of the thermoplastic material, if preheating is recommended by the thermoplastic manufacturer.
- l. The applicator shall be capable of containing a minimum of 1000 pounds of molten material (not applicable for hand-liner use).
- m. The applicator shall be mobile and maneuverable to the extent that straight lines can be followed and normal curves can be made in a true arc.
- n. The Contractor's striper shall be equipped with electrical foot counters. The counters shall individually tabulate the length of line applied by each gun whether solid or dashed. The Contractor shall determine the accuracy of the foot counters and establish an adjustment factor as required to determine the pay item quantities. The foot counters shall be periodically checked to assure accurate measurements. No thermoplastic shall be applied without the accurate operation of the foot counters. The Contractor shall provide the Engineer with a certified document on these calibrations.

2. Application Over Existing Markings

- a. Existing thermoplastic markings on asphalt road surfaces may be over laid with thermoplastic material providing that the existing markings (thermoplastic) are less than 30 mils thick, and are securely bonded to the substrate. If the thermoplastic is greater than 30 mils, or not securely bonded to the substrate, then it shall be ground to 30 mils, or removed completely if not securely bonded to the road.
- b. Existing solvent based paint on asphalt road surfaces may be over laid with thermoplastic provided that more than 75% of the road surface is exposed, and there is no more than a single coat of paint on the remaining unexposed area. If more than one layer of paint exists, the paint is not securely anchored to the substrate, or there is less than 75% of the road surface exposed, then the paint must be thoroughly removed.
- c. All existing polyester, epoxy, or other type pavement marking paints on asphalt or concrete road surfaces must be completely removed from all road surfaces prior to the installation of thermoplastic material.

- 3. Application Temperatures: To insure optimum adhesion, the pavement and ambient air temperature shall be 50° F and rising. The thermoplastic material shall be applied in a melted state at a temperature of 400° F to 425° F. The temperature of the material within the shaping dies shall be maintained at the manufacturer's recommendations for application temperatures, but in no case shall the temperature fall below 400° F or exceed 450° F.

The material shall not break down or deteriorate if held at the plastic temperature for a period of four (4) hours or by reason of three (3) reheatings to the plastic temperature (400° F to 425° F).

Where manufacturer's application temperatures differ from those as specified, the manufacturer's temperatures shall apply upon approval of the Engineer.

- 4. Line Quality: The finished lines shall have well defined edges and be free of waviness. Pavement marking lines shall be straight or of uniform curvature and shall conform with the tangents, curves, and transitions as specified in the pavement marking standards and/or as directed by the Engineer.
- 5. Line Thickness: The minimum thickness of the lines as viewed from a lateral cross section shall be not less than 90 mil near the edges, or less than 125 mil at the center. Drop-on glass beads shall not be included in the measurement, or if so, then appropriate allowances shall be made for the added mil

thickness. A device for gauging the installed material thickness shall be furnished to the Engineer as requested for use on the project. The gauge shall be easy to read and shall readily indicate excessive variations.

6. Clean Up: The Contractor shall be responsible for removing all pavement markings material spilled upon the roadway surface or adjoining area. The Contractor shall use methods acceptable to the Engineer for removing the spilled material.
 7. Line Repair: Any pavement marking which is crossed by a vehicle and tracked shall be replaced and any subsequent marking made by the vehicle shall be removed by methods acceptable to the Engineer at no additional cost to the Owner.
- C. Preformed Thermoplastic Pavement Markings: The markings shall be applied in accordance with the manufacturer's recommendations on clean and dry surfaces.
1. Asphalt: The materials shall be applied using the propane torch method recommended by the manufacturer. The material must be able to be applied at ambient and road temperatures down to 32° F without any preheating of the pavement to a specific temperature. The pavement shall be clean, dry and free of debris and oil or grease residue.
 - a. At temperatures below 50° F, the preformed thermoplastic pavement markings shall be kept as warm as possible to maintain flexibility.
 - b. Remove pavement surface moisture by holding a propane torch approximately 6 inches above the section of asphalt using a continuous circular motion.
 - c. Heat the pavement with the torch upon placing the material to a temperature of 200° F for 90 mil, and up to 300° F for 125 mil materials.
 - d. Immediately after the road surface has been properly preheated, position the material with exposed bead side up and heat.
 - e. Position the torch approximately 12-inches over the marking so the flame is extended and heat is evenly applied moving the torch in a circular motion across the marking. When the correct temperature of the marking has been reached, it will turn slightly darker or pale yellow if the material is white. Over heated or burned material shall be removed.
 - f. After the entire material section has been heated and bonded to the pavement, re-heat the perimeter of the marking and the road surface to bond the edges.
 - g. If installing reversible arrows, which do not contain a top coating of glass beads, the glass spheres shall be hand applied on the molten material.
 - h. Feather the leading edge of the pavement marking with a putty knife or bevel with the torch. Leading edges are any edge that would be susceptible to snow plow blades approaching from the direction of normal travel.
 - i. After cooling, use a putty knife to attempt to remove a portion of the material. The material shall not pry off without asphalt embedded to the underside.
 2. Concrete: New concrete surfaces must be sandblasted to entirely remove curing compound. The same application procedure shall be used as described for asphalt pavements. However, a compatible primer sealer may be applied before application to assure proper adhesion.
 3. Chip Seal Surfaces: The same application procedure shall be used as described for asphalt pavements. However, loose aggregate should be removed where the preformed thermoplastic pavement marking is to be applied.
- D. Cold Plastic Pavement Markings: The Contractor shall furnish and install white and yellow permanent retro-reflectORIZED cold preformed plastic pavement marking material at the location shown on the Plans, in conformance with the material specifications included herein.

The cold plastic markings shall consist of a homogeneous, extruded, prefabricated material of specified thickness and width which shall contain reflective glass spheres uniformly distributed throughout the cross-section, and shall be applied only to concrete pavement surfaces by means of an approved inlaid grinding process with pre-coated adhesive and pressure.

1. Contractor's personnel: It is important that the Contractor's personnel be completely knowledgeable of all application requirements and procedures prior to product application. It is the responsibility of the Contractor to contact the supplier of the cold plastic material if questions regarding application procedures or conditions arise.
2. Procedure: This procedure explains how to apply tape to concrete surfaces only. Apply the tape according to manufacturer's instruction in conjunction with an approved inlaid grinding method.
3. Road conditions: It is recommended that the tape be installed as soon as practical following tape manufacturer instructions.
 - a. Cold plastic pavement markings shall be inlaid by an approved grooving process into concrete pavement surfaces. Cold plastic will not be allowed on asphalt pavement surfaces whether inlaid into hot asphalt or existing asphalt surfaces. Grooving the pavement surface allows preformed pavement marking tape to better adhere by creating a fresh surface. Grooving also produces a lower profile marking by embedding the tape into the pavement surface, which helps protect the tape from snowplow damage.
 - b. The cutting head shall consist of diamond tipped cutting blades "gang stacked" 0.25 inches to 0.50 inches wide. The spacers between each blade must be such that there is less than a 10 mil raise in the finished groove between the blades. Water-cooling the blades may be necessary for long line grooving.
 - c. The groove width shall be equal to the tape width plus 1 inch $\pm$ 1/8 inch. The depth of the groove shall be 75% of the tape thickness $\pm$ 15%. For series 420, 60 mil tapes, the groove shall be 45 mils $\pm$ 10 mils or 0.05 inch $\pm$ 0.01 inch. The bottom of the groove should have a smooth, flat surface. If a coarse tooth pattern is present, increase the number of blades and decrease the thickness of the spacers between the blades on the cutting head. If water-cooling is used, flush the groove immediately after grooving to clean the surface.
 - d. Clean the surface of the road and the groove using a broom and/or high-pressure air blower. If either of these methods fail to clean the road surface, then high-pressure water wash shall be used. Road surface, including the surface of the groove must be dry and all dust, dirt, debris, oil, grease and foreign material removed before applying tape. If using water-cooling to groove, the groove must be completely dry prior to tape application.
4. Tape Application: If there is a crack in the pavement, or if the tape is to be applied over a bridge expansion joint, manhole or utility box, lay the tape over the crack joint or fitting, then cut the tape 1-inch away from the crack or joint on each side. Apply the required surface preparation adhesive and allow to dry completely (5–10 minutes at 70° F, but not over 30 minutes).
5. Tamping: Tamp the tape thoroughly with a tamping cart with a minimum 200 pound load, three times back and forth (six passes) over each part of the tape. Start in the center of the marking and work out to the edges removing any trapped air.
6. Do not twist or turn the tamper cart on the tape.
7. Make six passes (three passes back and forth) over each part of the tape (tamping is very important).
8. Make sure all edges are firmly adhered.

9. Application Conditions
 - a. Air temperature 60° F and rising.
 - b. Surface temperature 70° F and rising.
 - c. Overnight air temperature 40° F the night before tape application.
 - d. Pavement surface must be clean and dry. No rainfall should occur within 24 hours prior to application.
 - e. Butt splices must be used; do not overlap tape ends.
 - f. Traffic must be kept off of pavement surfaces coated with a surface preparation adhesive prior to tape application (follow manufacturer's instruction regarding the use of surface preparation adhesive).
 10. Surface moisture: Cold preformed plastic tapes will not adhere if moisture is present. Therefore, road surfaces must be dry and above the minimum required temperature for application of all tapes. If rainfall occurs within 24 hours prior to application, a surface moisture test (plastic wrap or roofing paper method as approved by the Engineer) must be performed and approval obtained from the Engineer. The groove must be visibly dry for a minimum of two hours prior to application. A moisture test shall be completed after the two-hour drying time to ensure no presence of moisture.
- E. Pavement Marking Paint: The Contractor shall furnish and install white and yellow retro-reflectORIZED pavement marking paint material at the location shown on the Plans, in conformance with the material specifications included herein.
1. The wet thickness and dry thickness of the pavement marking paint shall not be less than 15 mils and 12 mils, respectively without glass beads.
 2. Glass beads shall be applied uniformly over the entire length of line at the rate of 6 to 10 lbs. per gallon of paint.
 3. The gun tip shall be oriented perpendicular to the centerline to ensure that the beginning and ends of all lines are perpendicular to the centerline and not skewed.
 4. The equipment shall be maintained such that the needle can be fully closed when shut as to ensure square cut lines at the beginning and ends.
- F. Epoxy Pavement Marking: The Contractor shall furnish and install white and yellow epoxy markings at the location shown on the Plans, in conformance with the material specifications included herein.
1. Equipment
 - a. Use equipment that is capable of spraying both yellow and white epoxy in the manufacturer's recommended proportions. Provide equipment that can place stripes on the left and right sides, and place two lines simultaneously with either line in a solid or intermittent pattern in yellow or white. All guns must be in full view of operators at all times. If words, symbols, crosswalks, cross-hatching and stop bars are to be of epoxy resin material, equip the truck with a hand spray wand for such application. Mount the equipment on a truck of sufficient size and stability, and with an adequate power source, to produce lines of uniform dimension and prevent application failure. Provide equipment with metering devices to register the accumulated volume dispensed for each material, each day. Additionally, provide individual pressure gauges, clearly visible to the operator, for each pump used.
 - b. Provide equipment with two glass bead dispensers (double drop system) that uniformly distributes the glass beads to the surface of the epoxy pavement marking at a rate of at least

25 pounds per gallon. Glass beads may be applied by a pressure gun or controlled free fall.

2. Contractor's Personnel: Assure that at least one employee on the project when pavement markings are being applied holds an American Traffic Safety Services Association (ATSSA) pavement marking certification.
3. Surface Preparation
 - a. On existing pavements, remove the existing pavement markings in accordance with these specifications. Remove the existing markings and prepare the surface according to the manufacturer's recommendations (for the type of markings being installed).
 - b. On new Portland cement concrete pavement (PCCP), use shot blasting to remove curing compounds and laitance from the surfaces to which the pavement marking will be applied. Prepare the surfaces of new concrete bridge decks the same as new PCCP.
 - c. On all pavements, thoroughly remove all dirt, grit, grease, grime, vegetable matter, residue of prior pavement marking application (including such adhesives or primers that may have been used in their application), and any other foreign matter from the roadway surface prior to the application of epoxy pavement markings.
4. Alignment: All layout required in the construction of the pavement marking is the responsibility of the Contractor. Lay out the pavement marking as detailed on the Plans. When the Plans do not provide details, submit a layout plan (conforming to the requirements of the Manual on Uniform Traffic Control Devices (MUTCD)) for the pavement markings to the Engineer for approval. Normally locate longitudinal pavement marking stripes 2-inches from existing longitudinal joints. Provide adequate guide marks (approximately 2-inches by 6-inches at approximately 30 to 50 ft. intervals) for the application of the pavement markings.
5. Pavement Marking Application
 - a. When no traffic is present, and for edge lines under any condition of traffic, a slower curing epoxy material (40 minutes) may be used. When the application is taking place under traffic, use a fast setting (10 minutes) epoxy material for center lines and skip lines.
 - b. Apply the epoxy material closely behind the cleaning procedure.
 - c. Provide the Engineer with a copy of the manufacturer's application instructions. Apply the epoxy pavement markings in accordance with the manufacturer's recommendations. In the absence of manufacturer's recommendations, apply the markings when the ambient and pavement surface temperatures are 50° F and rising. Cease pavement marking operations when the ambient or the pavement surface temperature drops to 50° F.
 - d. Before mixing the components of the pavement marking material, heat the individual components to the temperature ranges recommended by the manufacturer of the material. Avoid exceeding the maximum recommended temperature at any time.
 - e. Apply the epoxy pavement marking material at a thickness of 20 mils $\pm$ 0.2 mils on asphalt and PCCP. Immediately apply the glass beads to the epoxy pavement marking at the rate of 25 pounds per gallon of epoxy, equally divided between the large and regular bead gradations. Apply the large beads on the first drop and the regular beads on the second.

2306.9 Method of Removal

Temporary pavement markings on milled surfaces scheduled to be overlaid do not have to be removed prior to performing the overlay. Permanent pavement markings installed on new asphalt surfaces shall be removed without structurally damaging the pavement or scarring the surface. The method of pavement marking tape removal shall be by a high-pressure water blast method, a low-pressure water and sand blast method, a steel shot blast method, or burning method. Grinding or black paint covering shall not be allowed on new pavement surfaces.

2306.10 Performance Measures

The Contractor shall remove and replace, at the Contractor's expense, any finished markings that have the following deficiencies:

- Drag marks, gashes, gouges, pitting, foreign covering, discoloration, or areas that have failed to solidify
- Improper adhesion, length, width, or thickness
- Glass bead inadequacy
- Ragged appearance with areas that do not present sharply defined edges
- Deviation from the specified layout by an unreasonable amount based on Engineer's judgment

Drippings between markings shall be removed when instructed by the Engineer and shall not result in visible deterioration of the pavement.

SECTION 2307 FENCING

2307.1 Scope

This section governs the furnishing all labor, materials, and equipment for the for the installation and removal of fencing as shown on the Plans and in accordance with the Standard Drawings, the specifications and the Special Provisions.

2307.2 Referenced Standards

The following standards are referenced directly in this section. The latest version of these standards shall be used. If conflicting standards are referenced, the more stringent standard shall apply.

KCMMB Kansas City Metro Materials Board Specifications

Kansas Department of Transportation

Standard Specifications for State Road and Bridge Construction, 2015 Edition

Section 828 – Fencing

Section 1620 – Material for Fencing

2307.3 Materials

- A. All materials used for the installation of a permanent chain link fence shall be new material conforming to:
 - 1. Section 1620 of the Kansas Standard Specifications for State Road and Bridge Construction except concrete for posts shall be, approved KCMMB 4K mix, or approved equal.
- B. All material used for the installation of permanent decorative fence shall be new material as specified or as shown on the Plans or that match the existing fence.

2307.4 Construction

- A. Removal: Existing fence shall be removed as specified or as shown on the Plans or as directed by the Engineer. Removed fencing may be used for temporary fencing only with the Engineer's approval. Fences interfering with construction, and located within public right-of-way or as may be allowed for in permits or agreements, may be removed by the Contractor only if the opening is provided with a temporary gate that will be maintained in a closed position except to permit passage of equipment and vehicles unless otherwise specified. Fences within temporary construction easements may be removed by the Contractor provided that temporary fencing is installed in such a manner as to serve the purpose of the fencing removed. The Contractor shall locate and record all fence corners prior to removal. All fencing removed shall be restored by the Contractor to a condition equal to or better than that existing prior to construction unless otherwise specified. The Contractor is liable for loss and costs associated with stray animals caused by the removal or improper construction of temporary or permanent fencing.
- B. Chain-Link Fence: Chain-Link Fence shall be installed at the locations shown on the Plans or as directed by the Engineer in accordance the applicable KDOT specifications for the state where the work is being performed. However, the bottom of the fabric shall be not more than 1 ½ inches above the finished ground line unless shown otherwise on the Plans. All residential fence shall have a top rail and all edges of fence fabric shall be knuckled.
- C. Decorative Fence: Decorative fence shall be installed at the locations shown on the Plans or as directed by the Engineer in accordance with the manufacturer's instructions and recognized industry standards or as directed by the Engineer.

SECTION 2308 STEEL BEAM GUARDRAIL

2308.1 Scope

This section governs the furnishing all labor, materials, and equipment for the for the installation of Steel Beam Guardrail as shown on the Plans and in accordance with the Standard Drawings, the specifications and the Special Provisions.

2308.2 Referenced Standards

ASTM

- A 36 Standard Specification for Carbon Structural Steel
- A 123 Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- A 153 Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

AASHTO

- M 180 Standard Specification for Corrugated Sheet Steel Beams for Highway Guardrail

2308.3 Materials

- A. Steel Posts: All posts, terminal post connectors, and steel blocks for guardrail shall be formed from a structural steel meeting the requirements of ASTM A 36, and shall be galvanized in accordance with ASTM A 123.
- B. Guardrail and Hardware: All guardrail and hardware shall conform to the requirements of AASHTO M 180 Class A, Type 1. Hardware shall be galvanized in accordance with ASTM A 153. Guardrail shall be galvanized with a minimum of 1.80 ounces of Zinc per sqft. All Zinc shall be "Prime Western" grade or better.

2308.4 Construction

- A. Setting Posts: Posts shall be set to the depth and spaced at the intervals shown on the Plans or Standard Drawings. They shall be set vertical and true to line and grade. Steel posts may be driven by a power hammer or may be set in dug or bored holes of a size sufficient to permit thorough compacting of the backfill around the post. The backfill material shall be dry sand, placed in layers not exceeding 12 inches in thickness to a depth of 12 inches below the finished grade. After erecting and adjusting the rail to true line and grade, the sand backfill shall be compacted by flooding. The final 12 inches of backfill consisting of suitable earth material shall then be compacted in six inch lifts. Any "mushrooming" of the top of a post shall be removed and damaged spelter coating on posts shall be repaired by the zinc alloy stick method while the surface is heated to approximately 600° F. Other methods of repairing the spelter coating shall receive prior approval of the Engineer.
- B. Erecting Guardrail: Bolt holes shall be shop punched. Field punching, reaming and drilling will not be permitted. Guardrail beams shall be spliced, only at posts by lapping in the direction of traffic, using the required number of splice bolts. Beams for twisted turned down terminal sections may be either field or shop twisted. Sufficient twist shall be introduced such that the beam shall retain the required shape in a relaxed condition. Beams to be erected on a radius of 150 feet or less shall be shop-curved as shown on the Plans. Each end of every installation of guardrail shall have an end, bridge anchor, or terminal section of the design and type shown on the Plans or Standard Drawings. They shall be of the same material and shall be galvanized in accordance with the requirements for the guardrail beam. Galvanized rail shall be handled in a manner to avoid damage to the galvanized coating. Any sections of rail, end sections or terminal sections on which the spelter coating has been bruised or broken shall be rejected, or may with the prior approval of the Engineer, be repaired by the method prescribed for repairing damaged spelter coating of steel posts.

END OF SECTION

TECHNICAL PROVISIONS

Section 2400

Seeding, Sodding and Overseeding



Unified Government of Wyandotte County

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SECTION 2400 GENERAL

2400.1 Scope

This section governs all general specifications necessary for installation of seeding, sodding, native grasses, hydroseeding and overseeding in accordance with the Standard Drawings, the specifications and Special Provisions.

The Contractor shall furnish all plants and materials and perform all operations in connection with the preparation, fertilizing, placing, watering, weeding, firming and establishment, of sodded and seeded areas (both temporary and permanent applications). All areas of established yards shall be restored by sodding unless otherwise approved by the Owner. The Contractor shall sod and/or seed disturbed areas where shown on the Plans or by field inspection, as required by the Storm Water Pollution Prevention Plan and pursuant to all permits, applicable federal and state laws. The Contractor shall be responsible for establishment of grass.

2400.2 Referenced Standards

UG

2150 Erosion and Sediment Control

Kansas Department of Transportation

Standard Specifications for State Road and Bridge Construction, 2015 Edition

KDOT Division 2100, and Division 900

Federal and State Department of Agriculture Regulations

Applicable State Weed Laws, Missouri Revised Statutes Chapter 263, and Kansas Statutes Annotated, Chapter 2. Article 13.

American Sod Producers Association (A.S.P.A.) "Specifications for Turfgrass Sod", and "Specifications for Topsoil Material and Application"

2400.3 Definitions

- A. Rough Grading is to mean the work necessary to prepare the subgrade for topsoil application and shall be compatible with the surrounding landscape while making a smooth transition to existing undisturbed conditions.
- B. Subgrade is to mean that level of earth below the topsoil layer.
- C. Compacted backfill is to mean a compaction of 90 percent standard proctor density for that material.
- D. Tolerance is to mean that amount above or below a given line.
- E. Certified Sod: State Certified Sod shall be turfgrass sod, grown from certified high quality seed that has been inspected by the State Certification Agency.
- F. Certified Seed: A grass or legume seed named variety that has been reviewed and accepted and meets all state and federal requirements, rules and regulations. The seed shall be grown and processed in the United States or Canada and comply with the requirements of the corresponding State Seed Law. Certified Seed shall be packaged and labeled with an inspection certificate from the State Certification Agency stating

genetic identity, purity, and freedom from noxious weeds as well as excessive amounts of other crop and weedy plants at time of harvest. Cleaning and conditioning of seed must result in a product that meets or exceeds minimum standards.

- G. Establishment Period: A period when planting work has been performed and initially accepted, and there is a Contract requirement to care for the planted areas in some way until the period ends.
- H. Fertilizer: The grade of fertilizer will be identified according to the percent nitrogen (N), percent of available phosphoric acid (P205), and percent water soluble potassium (K20), in that order, and approval will be based on that identification.
- I. Native Plant (existing): A variety of plant species occurring in its natural habitat without direct or indirect human actions.
- J. Noxious Weed: All weed designated by the State Weed Board as injurious to public health, agriculture, recreation, wildlife, or all public or private property. The United States Department of Agriculture (USDA) for the corresponding state will be the authority in determination of noxious weed species.
- K. Pure Live Seed (PLS): The amount of living seed in the total quantity of seed when non-viable seed or non-seed material is excluded. The following formula shall be used to determine the amount of commercial seed required to provide each kind of seed for the specified quantities of pure live seeds:

$$\text{Pounds of Commercial Seed Required} = \frac{10,000 \times \text{Pure Live Seed (lbs per acre)}}{\text{Purity (Percent)} \times \text{Germination (percent)}}$$
- L. Riparian: Related to the bank, shore, or water-influenced areas of a watercourse or water body.
- M. Sensitive Areas: Defined areas such as wetlands, natural water and riparian resources, special environmental zones, or where certain activities are restricted such as the use of chemicals.
- N. Specified Weeds: All noxious weeds as defined above, and all plant species identified in the Special Provisions or on the Plans as a species to be removed.
- O. Weed: A plant that is undesirable where it is growing.

2400.4 Submittals

Prior to delivery to the job site, Contractor shall submit to the Owner for approval the source and supplier of all grass seed, sod, fertilizer and mulch materials, along with the type of equipment to be used on this project and any tests completed. Manufacturer's bulletins, leaflets and other descriptive data which contain cuts, dimensions, and specifications will be acceptable for cataloged materials. Such bulletins, leaflets and other descriptive data shall be clearly marked to show which item is to be used and which paragraph of the contract specification it is to satisfy.

2400.5 Protection and Repair

The seeded/sodded area shall be kept free of traffic until accepted. If at any time before acceptance of the completed contract, any portion of the seeded surface becomes gullied or otherwise damaged, 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.

2400.6 Acceptance of Seeding and Sodding

- A. Acceptance: Acceptance by the Owner will occur when areas seeded and/or sodded are determined to be established turf areas ready for mowing. Grass areas in excess of one (1) square foot that are dead or in poor condition regarding color and quality shall be replaced at the Contractor's expense prior to the initiation of the Maintenance Period.
- B. Sod Watering: Throughout the Maintenance Period, the Contractor shall be responsible for watering the installed sod until it is established and ready for mowing. In the absence of rainfall, watering shall be performed daily during the first week and shall be sufficient to maintain moist soil to a depth of at least 4 inches. Soil on sod pads shall be kept moist at all times. Watering may be done during the heat of the day to help prevent wilting. After the second week, the Contractor shall water the sod as required to maintain adequate moisture in the upper 4 inches of topsoil necessary for the promotion of deep root growth until final acceptance as established turf areas ready for mowing.
- C. Seed Watering: The Contractor shall be responsible for watering seeded areas, keeping all areas moist throughout the germination period, following the substantial germination of the seed, and during the occurrence of a dry or drought period. Continued watering will be required until final acceptance as established turf areas ready for mowing.
- D. Acceptance Notification: After acceptance of the seeded or sodded area by the Owner, the Contractor shall by door hangers or other approved methods, notify all affected property owners that the maintenance of the grassed areas is now their responsibility.

2400.7 Clean-up

During the progress of this work and upon completion, thoroughly clean the project area, remove and properly dispose of all resultant dirt, debris and other waste materials.

2400.8 Guarantee

The Contractor shall guarantee all work and materials for a period of one full growing season (Spring to Fall) after the date of final acceptance of the project. During the guarantee period, all turf which dies or exhibits weed growth or undesirable grasses, free of eroded areas, bare spots, diseases and insects, shall be replaced with like material at the expense of the Contractor. Contractor to replace as originally specified areas which have failed to survive, as often as required, to establish the seeded/sodded lawn area until accepted, at no additional compensation. Contractor to repair and replace to original condition all damages to property resultant from the sodding operation and all damages as a result from the remedying of these defects, without additional compensation.

SECTION 2401 SEEDING

2401.1 Scope

This section governs furnishing all labor, materials and equipment necessary for complete installation of seeding in accordance with the Standard Drawings, the specifications and Special Provisions. The Contractor shall furnish all plants and materials and perform all operations in connection with the preparation, fertilizing, placing, watering, firming and establishment, of seeding areas, complete and in strict accordance with these specifications and applicable Plans, and subject to the terms and conditions of the Contract. The Contractor shall seed disturbed areas where shown on the Plans or by field inspection and as required by the Storm Water Pollution Prevention Plan. The Contractor shall be responsible for establishment of grass.

2401.2 Materials

A. Seed: Seed shall be labeled in accordance with U.S. Department of Agriculture Rules and Regulations under Federal Seed Act. All seed shall be furnished in sealed standard containers unless exception is granted in writing by the Owner. Seed shall be free from noxious weeds and recleaned "Grade A" recent crop seed treated with appropriate fungicide at time of mixing. Seed which has become wet, moldy, or otherwise damaged in transit or in storage will not be acceptable. Seed mix to be used will be identified prior to sowing. The minimum percentage by weight of pure live seed in each lot of seed shall be as follows:

1. Seeding – Mix #1 (Turf Areas)

Festuca arundinacea, Fineleaf Tall Fescue. Varieties- Hounddog V. Rebel Jr., Rebel III, Rebel 3D, Barlexas, Millennium, Southern Choice, Tar Heel, Wolf Pack, Bonsai 2000, Shortstop II Coyote, or other pre-approved substitutes 62.5%

Poa pratensis, Kentucky Bluegrass. Varieties- Baran, Nassau, Ram I, Nublu, Rugby II, Award, Blacksburg, Challenger, Eagleton, Limousine, Livingston, Midnight, Nuglade, Preakness, Princeton 105, Quantum Leap, 1757 or other approved substitutes 25.0%

Lolium multiflorum – annual ryegrass 12.5%

2. Seeding – Mix #2 (Low Use Areas)

Fescue ovina, Sheeps Fescue. Varieties- Azay, Big Horn, or other pre-approved substitutes 15.0%

Fescuca rubra subsp. Commutata, Chewings Fescue, Varieties-James town II, Victory, Tiffany, or other approved substitutes 20.0%

Fescuca longifolia, Hard Fescue. Varieties- Spartan, Tournament, Warwick, Discovery, Waldina, Aurora, 4 AG Attila, Reliant II, Scaldis, or other pre-approved substitutes 35.0%

Fescuca rubra subsp. Rubra, Creeping Red Fescue. Varieties- Shademaster II, Jasper, Cindy, Pennlawn, or other pre-approved substitutes 30.0%

3. Seeding Rate: Seed mixture shall be sown at the minimum rate of 10 pounds per 1000 square feet for new seeding. See Section 2405 for overseeding rates.

B. Inorganic Fertilizer: Inorganic fertilizer shall be composed of a formula 12-12-12, 13-13-13 or other

approved substitute, and shall conform to the applicable State fertilizer laws. Fertilizer shall be of a type that can be uniformly distributed by the application equipment. Fertilizer may be furnished in a dry (granulated) or liquid form. When applied dry, the fertilizer shall be a granular, non-burning chemically combined product composed of not less than 50% organic slow acting, guaranteed analysis professional fertilizer. Granular or pellet form shall be uniform in composition, dry and free flowing and shall be delivered to the site in the original unopened containers each bearing the manufacturer's guaranteed analysis. Any fertilizer which becomes caked or otherwise damaged, making it unsuitable for use, will not be accepted. When applied in a liquid form, fertilizer may be chemically combined or may be furnished as separate ingredients.

- C. Mulch: Mulch shall be the vegetative type, or wood cellulose fiber type, whichever is specified in the Special Provisions, or as approved by the Owner.
 - 1. Vegetative Type: The vegetative type shall be the cereal straw from stalks of oats, rye, wheat or barley and shall be free of prohibited and noxious weed seeds.
 - 2. Wood Cellulose Fiber Mulch: Wood cellulose fiber shall contain no germination or growth inhibiting ingredients, and shall be dyed an appropriate color to aid in visual metering in its application. It shall be easily and evenly dispersed and suspended when agitated in water, and when sprayed uniformly on the soil surface, shall form a blotter-like cover, which readily absorbs the water and allows infiltration to the underlying soil. The mulch material shall be supplied in packages of not more than 100 pounds gross weight, and shall be marked by the manufacturer to show the air dry weight content (air dry weight shall contain no more than 10 percent moisture).
- D. Water: Water, hose and other watering equipment required for the work shall be furnished by the Contractor.
- E. Other Materials: Other materials not specifically described but required for a complete and proper planting installation, shall be as selected by the Contractor subject to the approval by the Owner.
- F. Equipment: The seeding operation shall be accomplished with equipment suitable for preparing the seed bed, sowing the seed, fertilizing, spreading the vegetative type mulch, or spreading the wood cellulose fiber mulch in accordance with the applicable requirements of the following sub-section entitled "Construction".
- G. Top Soil: The Contractor shall make every reasonable effort to stockpile existing top soil prior to excavation and reuse it in the same general locations. No payment will be made for topsoil furnishing and placement necessary due to excessive hauling off of existing top soil on the project site.
- H. Qualifications of Workman: Provide at least one person, who shall be present at all times during the execution of this work, who is thoroughly familiar with all materials and installation procedures included in the Sodding and Seeding operations as specified herein.
- I. Delivery Containers: Deliver all items to the site in their original containers with all labels intact and legible at time of Owner inspection.
- J. Protection: Use all means necessary to protect all materials before, during and after installation, and to protect the installed work and materials of all other trades.
- K. Replacements: In the event of damage or rejection, immediately make all repairs and replacements to the approval of the Owner and at no additional cost to the Owner.
- L. Weather Conditions: All sodding and seeding shall be performed during favorable weather conditions and only during normal and acceptable planting seasons when satisfactory growing conditions exist. The

planting operations shall not be performed during times of extreme drought, when ground is frozen or during times of other unfavorable climatic conditions unless otherwise approved by Owner. The Contractor assumes full and complete responsibility for all such plantings and operations.

- M. Planting Dates: Recommended dates for all seeding and planting shall be March 15 through October 15 unless otherwise approved by the Owner.
- N. Pre-planting Inspection: Prior to the work of this section, the Contractor shall carefully inspect the installed work of all other trades and verify that all such work is complete to the point where installation may properly commence.
- O. Discrepancies: Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

2401.3 Construction

- A. All equipment used in the project and all workmanship shall meet the approval of the Owner.
- B. All areas to be seeded shall be tilled or disked to a depth of 3-4 inches and raked or smoothed to remove debris, clods, surface stone, 2-inches diameter or larger and weeds. Grades on the areas to be sodded or seeded shall be maintained in true, even and compacted conditions to prevent the formations of depressions. Areas overseeded, to be seeded that have washed or eroded shall be brought to grade and compacted thoroughly by the Contractor prior to placing the seeding or overseeding. No grading shall be done when the soils are in a muddy or frozen condition.
- C. Steel Edging: The finish sub-grade of areas to be planted shall be 2" below top of steel edging, if present, for grass sod and flush with top of steel edging for seeding.
- D. Other Edges: The finished sub-grade next to curbs, sidewalk and drive approaches shall allow for the seed to be placed level with the improvement. The sub-grade shall be finished level with the improvement for seeding.
- E. Fertilizer Application: For areas to be seeded, fertilizer shall be applied when area receives final grading and tillage.
- F. Application of Fertilizer: The Contractor has the option to obtain soil tests from a recognized testing laboratory, approved by Owner, to determine soil pH, nitrogen, phosphorus and potassium requirements and organic matter content. A pH of 5.8 to 7.0 and phosphorus and potassium levels of medium or higher range for the particular test used is required. Soils falling below these test levels must be supplemented with the appropriate materials to meet such test levels. If the above soil test is not performed a 13-13-13 fertilizer shall be applied at the rate of 400 pounds per acre.
- G. Acceptance of Plant Bed: Acceptance of the plant bed for seeding shall be obtained from the Owner for each section of area as indicated on the Plans. The Contractor shall be responsible for maintaining the accepted areas until the effective date for planting.
- H. 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. Seed should be drilled to a depth of 1/2 inch.

1. Seed mixed in proportions shown in Section 2401.2 may be broadcast by approved sowing

equipment. The seed shall be uniformly distributed over the designated areas. The seed shall be covered to an average depth of ½ inch by means of a brush harrow, spike-tooth harrow, chain harrow, cultipacker or other approved device.

2. Areas to be seeded shall be fertilized at rates specified in Section 2401.3.F. The seedbed shall be free of any irregularities in the surface, and shall be corrected in order to prevent formation of water pockets. All seeded areas are to be completely covered with hydromulch or with straw anchored to the soil a minimum depth of 3 inches by a disc harrow set nearly straight, to properly maintain soil moisture and to provide shade for the newly germinated chutes.
 3. Promptly after mulching, wet the seedbed thoroughly, keeping all areas moist throughout the germination period. Protect all turf areas by erecting temporary fences, barriers, signs, etc. as necessary to prevent trampling and disturbance.
 4. When delays in operations carry the work beyond the most favorable planting season for the grasses designated, or when conditions are such, by reason of drought, high winds, excessive moisture, or other factors that satisfactory results are not likely to be obtained, the seeding operation shall be stopped and work shall be resumed only when conditions are favorable again or when approved alternative or corrective measures and procedures have been put into effect. If inspection during seeding operations or after indicate there are areas which have been skipped, the sowing of additional seed on these areas will be required.
 5. The seeded areas will be inspected for acceptable grass coverage and will be acceptable when grasses designated are growing and are in good condition and no area more than ½ of one percent of the total areas shall be bare, of which no single area shall be more than one foot square in area. Any bare area larger than this will not be acceptable and shall be reseeded.
- I. 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.
- J. Maintenance Period: The Contractor shall be responsible for maintaining the installed grass seed and sod until all areas are complete and accepted by the Owner.
- K. Mulching: Mulching shall be done within 24 hours following the seeding operation except in the case of wood cellulose fiber type mulch.
1. Vegetative Type Mulch: After compacting the surface, mulch shall be uniformly spread at the rate of 1.5 tons per acre by means of a mechanical spreader or other approved means. As soon as the mulch is spread it shall be anchored to the soil a minimum depth of 3 inches by use of a heavy disc harrow, set nearly straight, or a similar approved tool. Discs of the anchoring tool shall be set approximately 9 inches apart. Anchoring shall be accomplished by not more than two passes of the tool.
 2. Wood Cellulose Fiber Type: Wood cellulose fiber mulch shall be added to the hydraulic seeder after the proportionate amounts of seed, fertilizer and water, and other approved materials are added. These ingredients shall be mixed to form a slurry which shall be applied at the rate of 1,000 pounds per acre. The mulch shall make a uniform coverage of the soil surface that will be satisfactory to the Owner.

SECTION 2402 SODDING

2402.1 Scope

This section governs the furnishing all labor, materials and equipment necessary for complete installation of sodding, in accordance with the Standard Drawings, the specifications and Special Provisions.

2402.2 Materials

- A. Sod: All grass sod shall be State Certified, nursery grown native mixture of Hounddog, Rebel, Pride, Cochise, Coyote or other substitute, as may be approved. Sod shall be a Tall Turf type Fescue with 10 percent Bluegrass that is free of objectionable grassy and broadleaf weeds. Sod shall be considered free of such weeds if less than 5 such plants are present per 100 square feet of area. Sod will not be acceptable if it contains any of the following weeds: Common burmudagrass,(wiregrass), quackgrass, johnsongrass, poison ivy, nutsedge, mumblewill, Canada thistle, bindweed, wild garlic, ground ivy, perennial sorral and bromeagrass, or as defined by current weed laws.
1. Pad Size: The sod shall be cut to supplier's standard width and length but not less than 12 x 24 inches and not more than 24 x 72 inches or bigger sizes that are approved by the Owner. There shall not be broken pads, torn or uneven ends.
 2. Strength: Root development shall be such that standard size pieces will support their own weight and retain their shape when suspended vertically from a firm grasp on the uppermost 10% of area.
 3. Mowing Height: Before harvesting sod, it shall be mowed uniformly at a height of 2 - 2½ inches. The sod shall be stripped or harvested by machine at a uniform thickness of 1½ inches ± ¼ inch. Measurement of thickness shall exclude top growth and thatch.
- B. Fertilizer: 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 trademark and warranty of the producer.
- C. Top Soil: The Contractor shall make every reasonable effort to stockpile existing top soil prior to excavation and reuse it in the same general locations. No payment will be made for topsoil furnishing and placement necessary due to excessive hauling off of existing top soil on the project site.
- D. Qualifications of Workman: Provide at least one person, who shall be present at all times during the execution of this work, who is thoroughly familiar with all materials and installation procedures included in the Sodding and Seeding operations as specified herein.
- E. Delivery Containers: Deliver all items to the site in their original containers with all labels intact and legible at time of Owner inspection.
- F. Protection: Use all means necessary to protect all materials before, during and after installation, and to protect the installed work and materials of all other trades.
- G. Replacements: In the event of damage or rejection, immediately make all repairs and replacements to the approval of the Owner and at no additional cost to the Owner.
- H. Weather Conditions: All sodding and seeding shall be performed during favorable weather conditions and

only during normal and acceptable planting seasons when satisfactory growing conditions exist. The planting operations shall not be performed during times of extreme drought, when ground is frozen or during times of other unfavorable climatic conditions unless otherwise approved by Owner. The Contractor assumes full and complete responsibility for all such plantings and operations.

- I. Planting Dates: Recommended dates for all seeding and planting shall be March 15 through October 15 unless otherwise approved by the Owner.
- J. Pre-planting Inspection: Prior to the work of this section, the Contractor shall carefully inspect the installed work of all other trades and verify that all such work is complete to the point where installation may properly commence.
- K. Discrepancies: Do not proceed with installation in areas of discrepancy until all such discrepancies have been fully resolved.

2402.3 Construction

- A. Sod shall not be harvested or delivered when excessively wet or dry. Sod shall be harvested, delivered and installed within a period of 36 hours. Protect sod from sun, wind, dehydration, and rain prior to installation that cannot be placed immediately on delivery. Sod showing visible signs of heating or dehydration will be rejected.
- B. Areas to be sodded shall be fertilized at the rates specified in Section 2401.3.F. The sod-bed shall be free of any irregularities in the surface resulting from fertilizing or other operations and shall be corrected in order to prevent the formation of water pockets. Freshly graded areas, which have set long enough to become dry and crusted over, shall be tilled as specified above, prior to placing the sod.
- C. The first row of sod should, if possible, be laid in a straight line with subsequent rows placed parallel and tightly against one another. Lateral joints shall be staggered as in brick laying to promote more uniform growth and strength. Care shall be exercised to ensure that the sod is not stretched or overlapped and that all joints are butted tight in order to prevent voids which would otherwise cause air drying of the roots. Where new sod meets existing grassed areas, a straight, vertical edge shall be cut to allow smooth match. Sod shall be watered and firmed in accordance with Section 2400.6.B. If it is necessary to walk excessively on newly laid sod or soil, walking boards should be laid for this purpose.
- D. Sod shall be laid with staggered joints and at right angles to direction of slope. Sod shall be secured by tamping or rolling. On slopes 4:1 or steeper and in drainage channels, all sod shall be anchored at minimum two-foot intervals to prevent movement under rainfall conditions.
- E. The Contractor shall be responsible for having adequate water available at the site prior to and during the installation of the sod and the areas to be seeded. The sod shall be watered immediately after installation to prevent drying during progress of the work. As sodding is completed on any one section, the entire area shall be thoroughly irrigated to a one inch depth below the new sod pad. After a short drying period, the sod shall be rolled with a roller weighing not less than 60 or more than 90 pounds per linear foot to firm the sod pad and smooth minor surface irregularities. Subsequent watering should maintain sod and soil moisture to a depth of at least four inches, supplement rainfall, to promote growth, promote proper rooting to insure sod survival, and to prevent dormancy.
- F. Apply second application of fertilizer at the rate of 300 pounds per acre two weeks after laying sod and prior to final acceptance.

- G. The sodded areas will be inspected for the acceptable grass coverage and will be acceptable when grasses designated are growing and are in good conditions, and no area more than $\frac{1}{2}$ of one percent of the total area shall be bare or dead, of which no single area shall be more than one foot square in area. Any bare or dead area larger than this will not be acceptable, and shall be resodded.
- H. Maintenance Period – The Contractor shall be responsible for maintaining the installed grass seed and sod until all areas are complete and accepted by the Owner.
- I. Maintenance of sodded areas shall include watering, weeding, mowing to a 2½ inch height after growth has exceeded 3 inches and prior to a 4 inch growth, replacement and installation of sod as originally specified for sodded areas failing to survive, and repair of rutting, should that occur. Clippings from mowing which mat on the grass are to be removed.

SECTION 2403 NATIVE GRASSES

2403.1 Scope

This section governs the furnishing all labor, materials and equipment necessary for complete installation of native grasses, in accordance with the Standard Drawings, the specifications and Special Provisions.

2403.2 Materials

Furnished and installed per Section 2403.3. Annual plants which sprout rapidly and survive for only one growing season are suitable only for establishing temporary vegetative cover. See Temporary Seeding, Section 2153.5.

- A. The seed mix will be as follows:
Short-grass Mix
Seeding Rate: 6.42 lb/Acre (40.3 Seeds/ft²)

GRASSES:					
SCIENTIFIC NAME	COMMON NAME	% of Mix	Seeds/ft ²	Rate/Acre	
Bouteloua curtipendula	Sideoats Grama	18.69%	2.6	1.200	PLS lb
Elymus canadensis	Canada Wild Rye	9.35%	1.1	0.600	PLS lb
Koeleria cristata	June Grass	1.56%	7.3	0.100	PLS lb
Schizachyrium scoparium	Little Bluestem	34.27%	12.1	2.200	PLS lb
Sporobolus aspera	Rough Dropseed	6.23%	4.4	0.400	PLS lb
Sporobolus cryptandrus	Sand Dropseed	0.31%	2.6	0.020	PLS lb
Sporobolus heterolepis	Prairie Dropseed	0.16%	0.1	0.010	PLS lb

WILDFLOWERS:					
SCIENTIFIC NAME	COMMON NAME	% of Mix	Seeds/ft ²	Rate/Acre	
Aster laevis	Smooth Blue Aster	0.31%	0.4	0.020	PLS lb
Astragalus canadensis	Canada Milk Vetch	1.56%	0.6	0.100	PLS lb
Chamaecrista fasciculata	Partridge Pea	6.23%	0.4	0.400	PLS lb
Dalea candidum	White Prairie Clover	0.93%	0.4	0.060	PLS lb
Dalea purpurea	Purple Prairie Clover	6.23%	2.6	0.400	PLS lb
Desmanthus illinoensis	Illinois Bundle Flower	7.79%	0.8	0.500	PLS lb
Desmodium canadense	Showy Tick Trefoil	0.93%	0.1	0.060	PLS lb
Lespedeza capitata	Round-headed Bush Clover	0.31%	0.1	0.020	PLS lb
Ratibida pinnata	Yellow Coneflower	3.12%	3.1	0.200	PLS lb
Rudbeckia hirta	Black-eyed Susan	2.02%	1.5	0.130	PLS lb

2403.3 Construction

- A. Prior to planting the topsoil in the disturbed area shall be tilled to 6 inches and compacted to approximately 80% density.
- B. Native grass seed shall be installed using a rangeland type grain drill seeder per the rates stated. Depths of seeding plants should be ½ inch.
- C. Spread and crimp 2,000 lbs. per acre of clean straw or hay within seven days of seeding.
- D. Contractor shall provide a minimum of one watering after planting to establish the cover crop.
- E. Cover crop shall provide 70% cover within 21 days of seeding.
- F. Contractor shall guarantee that seeded areas will have 80% cover within two full growing seasons.
- G. Contractor shall allow one application of selective herbicides in the spring to control weeds.
- H. Care must be taken to comply with manufacturers labels.

SECTION 2404 HYDROSEEDING

2404.1 Scope

This section governs furnishing all labor, materials and equipment necessary for complete installation of hydroseeding, in accordance with the Standard Drawings, the specifications and Special Provisions. Seed and fertilizer, mixed in proportions previously specified, may be broadcast in a hydromulch with water which forms an emulsion and covers the prepared designated areas in a uniform manner.

2404.2 Materials

Areas to be hydroseeded shall be fertilized at rates specified in Section 2401.3.F. The seed-bed shall be free of any irregularities in the surface, and shall be corrected to prevent formation of water pockets. Hydromulch used shall be a wood fiber mulch with tackifier, such as Conwit 2000, or approved equivalent. Hydromulch shall be applied at the rate of 1500 lbs. per acre.

2404.3 Construction

- A. Seed and fertilizer, mixed in proportions previously specified, may be broadcast in a hydromulch with water which forms an emulsion and covers the prepared designated areas in a uniform manner.
- B. Areas to be hydroseeded shall be fertilized at rates specified in Section 2405.3. The seed-bed shall be free of any irregularities in the surface, and shall be corrected to prevent formation of water pockets.
- C. Hydromulch used shall be a wood fiber mulch with tackifier, such as Conwit 2000, or approved equivalent. Hydromulch shall be applied at the rate of 1500 lbs. per acre.
- D. Hydroseeder filling tank should be $\frac{1}{2}$ full of water before adding seed, fertilizer and hydromulch components. Begin agitation while adding remaining water so that a uniform mixture is obtained. Seed, fertilizer and hydromulch components shall not be added to water more than four (4) hours prior to application.
- E. Discharge hydromulch slurry mix on prepared soil for uniform distribution.
- F. Keep all areas seeded moist throughout germination period. Protect all turf areas by erecting temporary fences, barriers, signs, etc. as necessary to prevent trampling and disturbance.
- G. The seeded areas will be inspected for acceptable grass coverage and will be acceptable when grasses designated are growing and are in good condition and no area more than $\frac{1}{2}$ of one percent of the total areas shall be bare, of which no single area shall be more than one foot square in area. Any bare area larger than this will not be acceptable and shall be reseeded.
- H. Contractor shall provide a minimum of one watering after planting to establish the cover crop.
- I. Cover crop shall provide 70% cover within 21 days of seeding.
- J. Contractor shall guarantee that seeded areas will have 80% cover within two full growing seasons.
- K. Contractor shall allow one application of selective herbicides in the spring to control weeds.
- L. Care must be taken to comply with manufacturers labels.

SECTION 2405 OVERSEEDING

2405.1 Scope

This section governs the furnishing all labor, materials and equipment necessary for complete installation of overseeding in accordance with the Standard Drawings, the specifications and Special Provisions. Overseeding is the planting of grass seed directly into the existing turf, without tearing up the turf, or the soil.

2405.2 Materials

All designated existing turf areas being overseeded shall use seed previously specified at the rate of 160 pounds per acre in a uniform manner. Areas to be overseeded shall be fertilized at rates previously specified.

2405.3 Construction

- A. The seed-bed shall be free of any irregularities in the surface, and shall be corrected in order to prevent formation of water pockets.
- B. Seed shall be applied with a seed drill. The seed drill shall verticut the soil to a minimum depth of $\frac{1}{2}$ inch at not more than $1\frac{1}{2}$ inch spacing between furrows.
- C. Areas that have washed or eroded shall be brought to grade and compacted prior to overseeding.
- D. The seeded areas shall be inspected for acceptable grass coverage and will be acceptable when grasses designated are growing and are in good condition. Not more than $\frac{1}{2}$ of one percent of the designated turf area shall be bare, of which no single area shall be more than one foot square in area. Any area left unseeded larger than this will not be acceptable, and be reseeded.

END OF SECTION

TECHNICAL PROVISIONS

Section 2500

Sanitary Sewer



Unified Government of Wyandotte County

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SECTION 2501 GENERAL

2501.1 Scope

This section governs the furnishing of all labor, materials and equipment for the complete installation of sewers and appurtenances as shown on the Plans and in accordance with the Standard Drawings, the specifications, and the Special Provisions.

2501.2 Referenced Standards

The following standards are referenced directly in this section. The latest version of these standards shall be used. If conflicting standards are referenced, the more stringent standard shall apply.

UG

Section 2100	Clearing, Grading, Excavation and Site Preparation
Section 2150	Erosion and Sediment Control
Section 2200	Paving
Section 2300	Incidental Construction
Section 2400	Seeding, Sodding and Overseeding

ASTM

A 48	Standard Specification for Gray Iron Castings
A 139	Standard Specification for Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4 and Over)
A 153	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
A 184	Standard Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement
A 307	Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength
A 449	Standard Specification for Hex Cap Screws, Bolts and Studs, Steel, Heat Treated, 120/105/90 ksi Minimum Tensile Strength, General Use
A 615	Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
A 1064	Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
C 32	Standard Specification for Sewer and Manhole Brick (Made From Clay or Shale)
C 33	Standard Specification for Concrete Aggregates
C 76	Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
C 109	Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens)
C 150	Standard Specification for Portland Cement
C 191	Standard Test Methods for Time of Setting of Hydraulic Cement by Vicat Needle
C 231	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
C 260	Standard Specification for Air-Entraining Admixtures for Concrete
C 270	Standard Specification for Mortar for Unit Masonry
C 361	Standard Specification for Reinforced Concrete Low-Head Pressure Pipe
C 443	Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
C 478	Standard Specification for Circular Precast Reinforced Concrete Manhole Sections
C 827	Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures
D 450	Standard Specification for Coal-Tar Pitch Used in Roofing, Dampproofing, and Waterproofing
D 698	Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft ³ (600 kN-m/m ³))
D 1248	Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable
D 1556	Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method
D 1784	Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds

D 2167	Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method
D 2235	Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings
D 2240	Standard Test Method for Rubber Property—Durometer Hardness
D 2241	Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
D 2321	Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
D 2412	Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
D 2584	Standard Test Method for Ignition Loss of Cured Reinforced Resins
D 2657	Standard Practice for Heat Fusion Joining of Polyolefin Pipe and Fittings
D 2661	Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe and Fittings
D 2837	Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products
D 3034	Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
D 3139	Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
D 3212	Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
D 3262	Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Sewer Pipe
D 3350	Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
D 3754	Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Sewer and Industrial Pressure Pipe
D 3839	Standard Guide for Underground Installation of "Fiberglass" (Glass-Fiber Reinforced Thermosetting-Resin) Pipe
D 4101	Standard Specification for Polypropylene Injection and Extrusion Materials
D 4161	Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe Joints Using Flexible Elastomeric Seals
D 5685	Standard Specification for Fiberglass (Glass-Fiber-Reinforced Thermosetting-Resin) Pressure Pipe Fittings
D 6938	Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
F 477	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
F 628	Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40 Plastic Drain, Waste, and Vent Pipe With a Cellular Core
F 679	Standard Specification for Poly(Vinyl Chloride) (PVC) Large-Diameter Plastic Gravity Sewer Pipe and Fittings
F 714	Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Outside Diameter
F 1417	Standard Practice for Installation Acceptance of Plastic Non-pressure Sewer Lines Using Low-Pressure Air
F 3125	Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength, Inch and Metric Dimensions

ANSI/AWWA

C 104/A21.4	Cement-Mortar Lining for Ductile-Iron Pipe and Fittings
C 105/A21.5	American National Standard for Polyethylene Encasement for Ductile-Iron Pipe Systems
C 110/A21.10	American National Standard for Ductile-Iron and Gray-Iron Fittings, 3 In. Through 48 In.
C 111/A21.11	American National Standard for Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
C 115/A21.15	American National Standard for Flanged Ductile-Iron Pipe with Threaded Flanges
C 150/A21.50	American National Standard for Thickness Design of Ductile-Iron Pipe
C 151/A21.51	American National Standard for Ductile-Iron Pipe, Centrifugally Cast, for Water
C 153/A21.53	American National Standard for Ductile-Iron Compact Fittings for Water Service

AWWA

C 302	Reinforced Concrete Pressure Pipe, Noncylinder Type
C 600	Installation of Ductile Iron Water Mains and Their Appurtenances
C 950	Fiberglass Pressure Pipe

ANSI

Z 60.1 American Standard for Nursery Stock

KCMMB Kansas City Metro Materials Board Specifications

2501.3 Cleanup

Cleanup shall follow the work progressively. The Contractor shall remove from the project site all rubbish, equipment, tools, surplus or discarded materials, and temporary construction items.

Streets to be opened to local traffic at the end of the day's operation shall be cleaned of dirt or mud. All equipment and material stockpiles shall be secured for safe passage of vehicles and pedestrians.

All work shall comply with Section 2150 "Erosion and Sediment Control".

SECTION 2502 MATERIALS

2502.1 Scope

This section governs the furnishing of all labor, materials and equipment that may be required to complete pipeline construction, exclusive of structures, as shown on the Plans and in accordance with the Standard Drawings, the specifications and the Special Provisions.

- A. Requirements: Furnish pipe of materials, joint types, sizes, and strength classes indicated or specified. Higher strengths may be furnished at the Contractor's option at no additional cost to the Owner.
- B. Manufacturer: The manufacturer shall be experienced in the design, manufacture and commercial supplying of the specific material.
- C. Inspection and Testing: Inspection and testing shall be performed by the Manufacturer's quality control personnel in conformance with applicable standards. Testing may be witnessed by Owner, Engineer, or approved independent testing laboratory. The Contractor shall provide three (3) copies of certified test reports indicating the materials conform to the specifications.
- D. Handling: The manufacturer and contractor shall use equipment and methods shall be adequate to protect the pipe, joint elements and prevent shock contact of adjacent units during moving or storage. Damaged sections that cause reasonable doubt as to their structural strength or water-tightness will be rejected. No pipe or fitting shall be delivered until the certified test reports are approved by the Engineer.

2502.2 Pipe, Fittings, Joints, Coatings and Linings

- A. General: Furnish pipe and fittings of materials, joint types, sizes, strength classes, coatings and linings as indicated and specified.
- B. Ductile-Iron Pipe and Fittings: Pipe and fittings shall conform to ANSI/AWWA C151/A21.51, ANSI/AWWA C110/A21.10, and ANSI/AWWA C153/A21.53 except as otherwise specified herein.
 - 1. General: Furnish maximum pipe lengths normally produced by the manufacturer except for fittings, closures and specials.
 - 2. Design: All ductile iron pipe shall meet the requirements of ANSI/AWWA C150/A21.50 and ANSI/AWWA C151/A21.51 and shall be of the thickness class specified herein or shown on the drawings. The minimum thickness allowed shall be Special Class 50.
 - 3. Joints: Mechanical and push-on joints for pipe and fittings shall conform to the requirements of ANSI/AWWA C111/A21.11. Flanged joints for ductile iron pipe and fittings shall conform to the requirements of ANSI/AWWA C115/A21.15. Gaskets shall be neoprene or other synthetic rubber material. Natural rubber gaskets will not be accepted.
 - 4. Fittings: Fittings shall be in accordance with ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53 and shall have a pressure rating of not less than that specified for the pipe. Fittings used with ductile iron pipe shall be ductile iron. Fittings for pipe with mechanical joints shall have mechanical joints. Fittings for pipe with push-on joints shall have either mechanical joints or push-on joints.
 - 5. Coatings: Pipe and fittings shall be furnished with exterior bituminous coating conforming to ANSI/AWWA C151/A21.51.
 - 6. Linings: Pipe and fitting interior linings shall be hydrogen sulfide resistant and conform to the following:

- a. Calcium aluminate-mortar lining conforming to AWWA/ANSI C104/A21.4, a 40 mil ceramic quartz filled amine cured novalac epoxy lining, a 40 mil polyethylene lining in accordance with ASTM D 1248, or be PVC (polyvinyl chloride) lined.
 - b. Protecto 401 Ceramic Epoxy or approved equal.
 7. Polyethylene Encasement: Pipe and fittings shall be installed with a polyethylene tube encasement having a thickness of 0.008" (8 mils) and conforming to Section 4.1.1 of ANSI/AWWA C105/A21.5.
- C. Polyvinyl chloride (PVC) Pressure Rated Plastic Pipe (SDR) and Fittings: Pipe and fittings shall conform to ASTM D 2241, except as otherwise specified herein.
1. General: Furnish maximum pipe lengths normally produced by the manufacturer, except for fittings, closures and specials. Pipe shall be used only for pressure flow systems.
 2. Materials: The pipe shall be made of PVC plastic pipe having a cell classification of 12A54 B or 12A54 C as defined in ASTM D 1784.
 3. Design: Pressure flow systems, i.e., force mains, shall have the wall thickness shown on the plans, with a minimum wall thickness not less than SDR 32.5 with a minimum burst pressure not less than 400 psi conforming to pipe materials designation codes PVC 1120, PVC 1220, or PVC 2120.
 4. Joints: Pressure flow systems shall be joined in accordance with ASTM D 3139 with particular attention given to Section 5.3. Joints shall be push-on type only with the bell-end grooved to receive a gasket. Elastomeric seals (gaskets) shall have a basic polymer of synthetic rubber complying with ASTM F 477. Natural rubber gaskets will not be accepted.
 5. Fittings: Fittings for pressure flow systems shall be ductile iron or PVC. Ductile iron fittings shall be mechanical joint conforming to Section 2502.2.B.3. PVC fittings shall have a minimum wall thickness conforming to SDR 32.5 and a minimum hydrostatic design stress of 400 psi conforming to pipe materials designation codes PVC 1120, PVC 1220, and PVC 2120.
- D. Type PSM polyvinyl chloride (PVC) Sewer Pipe and Fittings: 4 through 15 inch diameter pipe and fittings shall conform to ASTM D 3034 and pipe having a diameter 18 inches through 27 inches shall conform to ASTM F 679 except as otherwise specified herein.
1. General: Furnish maximum pipe lengths normally produced by the manufacturer except for fittings, closures and specials.
 2. Materials: The pipe shall be made of PVC plastic having a cell classification of 12454 B or 12454 C or 13364 B as defined in ASTM D 1784.
 3. Design: Pipe shall have an integral bell and spigot joint. Wall thickness shall be SDR 26, or SDR 21 as shown on plans. If for any reason the depth of cover on SDR 26 pipe becomes greater than 15 feet, the Contractor shall immediately notify the Engineer.
 4. Joints: Joint tightness shall conform to ASTM D 3212. Joints shall be push-on type only with the bell-end grooved to receive a gasket. Elastomeric seal (gasket) shall have a basic polymer of synthetic rubber conforming to ASTM F 477. Natural rubber gaskets will not be accepted.
 5. Fittings: Fittings defined as tee (T) or wye (Y) connections suitable for assembly to four (4) inch or six (6) inch building service lines shall be bell-end with a minimum wall thickness conforming to SDR 26 and shall be furnished by the pipe manufacturer. A special design is required for service connections 8

inches and larger. Saddle tees or wyes should not be used and will only be permitted in special circumstances to be determined by the County Engineer.

E. Fiberglass (Glass-Fiber-Reinforced Thermosetting-Resin) Wastewater Pipe (36-inch diameter and larger)

1. General: This specification designates requirements for fiberglass glass-fiber reinforced thermosetting-resin pipe (RTRP) for the conveyance of wastewater. Pipe for gravity application shall conform to ASTM D 3262 for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Sewer Pipe. Pipe for force main applications shall conform to ASTM D 3754 for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Sewer and Industrial Pressure Pipe. If ASTM D 3754 pipe is selected, its actual outside diameter shall be in accordance with AWWA C 950 Fiberglass Pressure Pipe.
2. Materials: Material used in the manufacture of the pipe, fittings and specials shall conform to the following:
 - a. Resin Systems: The manufacturer shall use only polyester resin system with a proven history of performance in corrosive environments found in wastewater collection systems. The historical data shall have been acquired from a composite material of similar construction and composition as the proposed product. Certification of resin compounding shall be provided by the pipe manufacturer prior to shipment to the job site. One test to verify resin compounding may be required by the Engineer. The test shall be performed by an independent testing laboratory approved by the Engineer and shall be performed upon a sample of pipe obtained from the job site. The cost of the test shall be paid for by the Contractor and shall be included with the bid price for pipe. The test shall be performed in accordance with ASTM D 2584 Standard Test Method for Ignition Loss of Cured Reinforced Resins.
 - b. Glass Reinforcements: The reinforcing glass fibers used to manufacture the components shall be of the highest quality commercial grade E-glass filaments with binder and sizing compatible with impregnating resins.
 - c. Silica Sand: Sand shall be minimum 98% silica with a maximum moisture content of 0.2%.
 - d. Additives: Resin additives, such as curing agents, pigments, dyes, fillers, thixotropic agents, etc., when used, shall not detrimentally effect the performance of the product.
 - e. Elastomeric Gaskets: Gaskets shall meet ASTM F 477 and be supplied by qualified gasket manufacturers and be suitable for the service intended.
3. Stiffness: Pipe shall conform to the requirements of AWWA M45 for the size and strength. Minimum pipe stiffness at 5-percent deflection shall be 46-psi (3.2-kg/cm²) for gravity and pressure wastewater conduit as specified for all sizes when calculated in accordance with ASTM D 2412 Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading.
4. Joints: Joint tightness shall be tested in accordance with ASTM D 4161 for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe Joints Using Flexible Elastomeric Seals. Unless otherwise specified, the pipe shall be field connected with fiberglass sleeve couplings that utilize elastomeric sealing gaskets as the sole means to maintain joint water-tightness.
5. Fittings: Fittings shall conform to ASTM D 5685 Fiberglass (Glass-Fiber-Reinforced Thermosetting-Resin) Pressure Pipe Fittings or D 3840 Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe Fittings for Non-pressure Applications.

F. High Density Polyethylene (HDPE)

1. General: Furnish maximum lengths normally produced by the manufacturer except for fittings, closures and specials.

2. Materials: All new pipe and fittings shall be solid wall high density polyethylene (HDPE) pipe, meeting the requirements of ASTM F 714 Polyethylene (PE) Plastic Pipe (SDR-PR) based on outside diameter, ASTM D 1248, ASTM D 3350. All HDPE pipe shall be marked with a green stripe to signify its use for sanitary sewer utilities.
 - a. The pipe shall be manufactured from high density high molecular weight polyethylene resin which conforms to ASTM D 1248. The pipe produced from this resin shall have a minimum cell classification of 345434C under ASTM D 3350.
 - b. The HDPE pipe shall have a wall thickness as shown on the Plans or Standard Drawings with a minimum wall thickness conforming to DR11 with a working pressure rating of 160 psi. HDPE pipe diameters shown on plans are iron pipe sizes which provide the nominal inside diameter necessary to exceed the flow capacity of cement lined ductile iron pipe.
 - c. The pipe and fitting manufacturer shall certify that samples of his production pipe have undergone stress regression testing, evaluation, and validation in accordance with ASTM D 2837 and PPI TR-3. Under these procedures, the minimum hydrostatic design basis shall be certified by the pipe manufacturer to be 1600 psi at 73.4°F and 800 psi at 140°F.
 - d. As approved by the Engineer, electrofusion fittings may be allowed in lieu of fittings designed for butt fusion.
 - e. The HDPE pipe shall be provided to the project site in straight sections and shall not have been coiled at any time.
 - f. All inner welds / beads shall be removed.
 - g. Fittings: Lateral connections shall be made with an Inserta Tee or approved equal.

G. Polypropylene Pipe

1. General: Furnish maximum lengths normally produced by the manufacturer except for fittings, closures and specials.
2. For 12-inch to 24-inch pipe, polypropylene pipe shall have a double wall with a smooth interior and annular exterior corrugations and conform to ASTM F2764. For 30-inch and larger pipe sizes, polypropylene pipe shall have a triple wall with smooth interior and exterior surfaces with inner corrugations and conform to ASTM F 2764. The pipe shall not be perforated unless otherwise specified.
3. For 12-inch to 60-inch pipe, pipe shall be joined with a dual-gasketed integral bell and spigot joint meeting the requirements of ASTM F2764.
4. The joint shall be watertight according to the requirements of ASTM D3212 and ASTM F2764 Section 7.10. Gaskets shall meet the requirements of ASTM F477. 12- through 60-inch diameters shall have a reinforced bell with a polymer composite band installed by the manufacturer.

H. Tees, Wyes, And Building Service Lines

1. General: All service lines are gravity. Tees, wyes, and building service lines shall be installed as shown on the Plans and Standard Drawings or specified herein. Saddles will only be allowed with the approval of the Engineer.
2. Materials: Material used in the manufacture of the pipe, fittings and specials shall conform to the following:
 - a. Acrylonitrile-Butadiene-Styrene (ABS) Service Line Pipe and Fittings
 - i. Pipe and fittings shall conform to ASTM F 628 Foamed Core DWV, ASTM D 2661

liner plates shall be such that assembly can take place entirely from within the tunnel liner. Liner plates shall be capable of withstanding the ring thrust load and transmitting this from plate to plate. The minimum outside diameter shall be four (4) feet and the minimum wall thickness shall be United States Standard Gauge 12 (0.1094 inches). Sufficient sections shall be provided with one and one-half (1½) inch or larger grouting holes located near the centers so that when plates are installed there will be one line of holes on either side of the tunnel and one at the crown; the lower line of holes on each side shall not be more than eighteen (18) inches above the invert. The holes in each line shall not be more than five (5) feet apart and unless otherwise approved, shall be staggered. Bolts and nuts shall conform to ASTM A 153, A 307, F 3125 and A 449 as applicable. Steel liner plates shall have bolted joints in both longitudinal and circumferential planes. Stagger longitudinal joints in adjacent rings when assembling.

- C. Steel Casings: Steel casings for bored or jacked construction shall be steel pipe conforming to ASTM A 139 with a minimum diameter as shown on the Plans.

1. Minimum wall thickness shall be in accordance with the following table:

<u>Diameter of Casing-Inches</u>	<u>Nominal Wall Thickness-Inches</u>	
	<u>Under Railroads</u>	<u>All Other Uses</u>
16	0.312	0.188
18	0.312	0.250
20	0.375	0.250
22	0.375	0.250
24	0.406	0.281
26	0.438	0.281
28	0.469	0.312
30	0.469	0.312
32	0.500	0.312
34	0.500	0.312
36	0.500	0.344

2. Steel shall be Grade B with a minimum yield strength of 35,000 psi under railroads and Grade A on all other uses.
3. Steel pipe shall have welded joints in accordance with AWWA C 206.

- D. Reinforced Concrete Pipe: Reinforced concrete pipe used as casing shall conform to ASTM C 76.

1. Design: Provide ASTM C 76 circular pipe of the strength class required for the jacking of pipe when determined by method set forth in the latest printing of Concrete Pipe Design Manual prepared by the American Concrete Pipe Association.
2. Joints: Reinforced concrete pipe used for casing pipe shall be provided with steel end joint with a groove in the spigot end for an O-ring gasket. The O-ring gasket shall be synthetic rubber. Both joint and gasket shall otherwise conform to ASTM C 361.
3. Interior Protection: Interior protection is NOT required for reinforced concrete pipe used for casing conduit.

- E. Casing Conduit Grout: Casing conduit grout shall be a pumpable grout resulting in minimum set strength of 400 psi in 28 days.

- F. Sand: Sand used as fill in casing conduits shall be a clean sand and thoroughly dry. All sand fill shall conform to

the requirements under ASTM C33.

G. Pipe Supports shall conform to the following:

1. Casing Spacers: Casing spacer shall be a two-piece shell or band made from T-304 stainless steel of a minimum 14 gauge thickness. The shell/band shall have risers made of 10 gauge T-304 stainless steel and have a PVC liner. The bearing surface (skid or runner) shall be made of an ultra-high molecular weight polymer, glass reinforced polyester, or fiberglass reinforced nylon. The shell/band shall be bolted together with T-304 stainless steel bolts. The configuration of the carrier pipe in the casing pipe shall be centered. End seals shall be made by the same manufacturer as the casing spacers and shall use stainless steel bands to hold end seals to pipes.
2. Wood Skids: Wood skids shall be provided as indicated on the Plans. The wood shall be treated with a preservative as approved by the Engineer. Cut surfaces shall be given two (2) heavy brush coats of the same preservative. If PVC pipe is used as the carrier pipe, the wood skids shall be compatible with the PVC pipe.

SECTION 2503 SITE PREPARATION

2503.1 Scope

This section governs the furnishing of all labor, materials and equipment for Site Preparation as shown on the Plans and in accordance with the Standard Drawings, the specifications and the Special Provisions.

2503.2 General

- A. See Section 2101 for Site Preparation.

SECTION 2504 EXCAVATION

2504.1 Scope

This section governs the furnishing of all labor, materials and equipment for pipeline excavation for open cut, tunneling, boring, and jacking as shown on the Plans and in accordance with the Standard Drawings, the specifications and the Special Provisions.

2504.2 General

The terms "excavation" and "trenching" shall mean the removal and subsequent handling of all material required to perform the work.

- A. All pipeline excavation work shall be accomplished under supervision of a person experienced with the materials and procedures which will provide protection to existing improvements, including utilities and the proposed pipeline.
- B. The alignment, depth, and pipe subgrades of all sewer trenches shall be determined by a laser beam parallel to the sewer invert.
- C. When pipe is to be installed in embankment or fill, the embankment shall be constructed in accordance with section 2102.6 and shall be built up to a plane at least 18 inches above the top of the pipe prior to the excavation of the sewer trench.
- D. The Contractor shall not open more trench in advance of pipe laying than is necessary. Four hundred (400) feet will be the maximum length of open trench allowed on any line under construction. All open trenches shall be adequately protected.
- E. In the event hazardous wastes as defined by the Resource Conservation and Recovery Act of 1976 (PL94-580) are encountered, work shall be halted and the Engineer shall be notified. Work shall be resumed only after the Engineer notifies the Contractor. Regulation of removal, handling and disposal of hazardous wastes is the responsibility of Federal and State agencies.

2504.3 Classification of Excavated Material

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 contract work regardless of the type, character, composition, or condition thereof. See Section 2100 "Clearing, Grubbing, Excavation and Site Preparation".

2504.4 Removal of Water

The Contractor shall provide and maintain adequate dewatering equipment to remove and dispose of all surface and groundwater entering excavations, trenches, or other parts of the work. Each excavation shall be kept dry during subgrade preparation and continually thereafter until the structure to be built, or the pipe to be installed therein, is completed to the extent that no damage from hydrostatic pressure, flotation, or other cause will result.

All excavations for concrete structures or trenches which extend down to or below static groundwater elevations shall be dewatered by lowering and maintaining the groundwater surface beneath such excavations a distance of not less than 12-inches below the bottom of the excavation.

Surface water shall be diverted or otherwise prevented from entering excavated areas or trenches to the greatest extent practicable without causing damage to adjacent property.

The Contractor will be held responsible for the condition of any pipe or conduit which he may use for drainage purposes, and all such pipes or conduits shall be left clean and free of sediment.

2504.5 Blasting

Blasting: When blasting is permitted by the Engineer, the Contractor shall use the utmost care to protect life and property. The Contractor shall obtain any required permits from the agency having site jurisdiction and shall comply with all laws, ordinances, and the applicable safety code requirements and regulations relative to the handling, storage and use of explosives and protection of life and property, and he shall be responsible for all damage caused by his or his subcontractor's operations.

The Contractor shall provide insurance as required by the Contract Documents before performing any blasting. The governing agency shall be notified at least 24 hours before blasting operations begin.

2504.6 No Blasting Areas

No Blasting Areas: No blasting of any kind for rock excavations or any other purpose will be allowed unless noted otherwise on the Plans or permitted by the Engineer. No blasting within 250 feet of any structures or as specified by the Fire Department.

2504.7 Open-Cut Method (Trenching)

- A. General: Excavations for pipelines shall be accomplished by the open-cut method (trenching) except as specified or approved by the Engineer. Trenching shall be with a minimum inconvenience and disturbance to the general public.

The Contractor shall sort and stockpile the excavated material so the proper material is available for backfill.

- B. Trench Depths: All trenches shall be excavated to depths required for proper pipe embedment. Overdepth excavation shall be required when the subgrade is unstable. Overdepth excavations shall be backfilled with granular pipe embedment material unless otherwise directed by the Engineer.

- C. Trench Walls: Undercutting of trench walls is not permitted.

- D. Trench Widths

1. Minimum Widths: Minimum trench widths shall be in accordance with the Plans, Standard Drawings, and manufacturers' recommendations.

2. Maximum Widths: The allowable maximum trench widths hereinafter specified apply only to that portion of the trench below the horizontal plane parallel to and six (6) inches above the top of the pipe. The allowable maximum widths may be exceeded at manholes, bore pits, tees, and in unstable earth material. Where the maximum trench width is exceeded the Contractor shall provide the appropriate strength class of pipe embedment to provide safe support strength to the pipeline.
3. When the side clearance exceeds two and one-half (2.5) times the outside pipe diameter at either side of a flexible conduit, it shall be the Contractor's responsibility at no additional cost to the Owner to provide bedding adequate to develop the required lateral support for the pipe and/or provide a pipe of sufficient strength class to accommodate the loading conditions as approved by the Engineer.
4. Trench Slope: The trench width above a horizontal plane six (6) inches above the top of the pipe may vary and side sloping is permissible unless otherwise specified.
5. Trench Shields: When trench shields are utilized by the Contractor, said shields or any part thereof shall not extend lower than twelve (12) inches above the top of the proposed pipeline nor shall the maximum allowable trench width be exceeded.
6. Sheet piling and Shoring: Except where banks are cut back on a stable slope, excavation for structures and trenches shall be properly and substantially sheeted, braced, or shored as necessary to prevent caving or sliding, to provide protection for workmen and the work, and to provide protection for existing structures and facilities. Sheet piling, bracing, and shoring shall be designed and built to withstand all loads that might be caused by earth movement or pressure and shall be rigid, maintaining shape and position under all circumstances.

Trench sheet piling shall not be pulled unless pipe strength is sufficient to carry trench loads based on trench width to the back of sheet piling.

Sheet piling shall not be pulled after backfilling.

Where trench sheet piling is left in place, such sheet piling 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 sheet piling may be removed after pipe embedment has been completed.

- E. Maximum Trench Widths for Reinforced Concrete and Ductile Iron Pipe: When reinforced concrete and ductile iron pipe is utilized, the strength class and the maximum allowable trench width will be shown on the Plans.
- F. Option to Trenching: Contractor may perform excavation by tunneling methods as set forth herein at no additional cost to the Owner provided prior written approval for each such location is obtained from the Engineer.

2504.8 Tunneling, Boring and Jacking

- A. General: Tunneling includes all underground horizontal excavations necessary to install the pipeline. The Contractor shall submit to the Engineer, prior to actual work, a written description of his proposed tunneling operation. It shall include the types and locations of shafts, methods to provide safe support strength for the pipeline when the shafts or bore pits exceed maximum allowable trench widths and other features that would affect the pipeline.

Tunneling shall be done with a minimum inconvenience and disturbance to the general public and abutting

property owners.

- B. Tunnel Cross Section: The tunnel shall be circular in cross section and of the size specified. Alternate size and shape may be submitted for consideration by the Engineer.
- C. Construction
 - 1. General: All tunnel excavation shall provide an excavation conforming to the outside diameter of the casing and/or carrier conduit. The excavation shall be to an alignment and grade which will allow the carrier conduit to be installed to proper line and grade as shown on the Plans and as established in Section 2505.4.
 - 2. Excavation: Conduct excavation in a manner to prevent disturbing overlying and adjacent material. Perform dewatering and chemical soil stabilization or grouting if necessary, due to existing field conditions.

SECTION 2505 INSTALLATION

2505.1 Scope

This section governs the furnishing of all labor, materials and equipment for the installation of gravity and pressure pipelines and appurtenances as shown on the Plans and in accordance with the Standard Drawings, the specifications and the Special Provisions.

2505.2 General

All pipeline installations shall conform to the following requirements:

- A. Governmental Requirements: Sanitary sewer line installation shall comply with applicable State and County Health and Environment Department requirements.

The Kansas Department of Health and Environment (KDHE) has requirements for the protection of potable water systems that may affect the work covered by this Section. The most current version of these requirements can be downloaded from the KDHE website.

- B. Trench Dewatering: Contractor shall maintain a dry and stable trench, obtain necessary permits, and provide for the proper method of discharging such water from the work site at all times until pipeline installation is completed to the extent that hydrostatic pressure flotation or other adverse effects will not result in damage to the pipeline.

Proper dewatering techniques are the Contractor's responsibility. All work performed by the Contractor which is adversely affected by his failure to adequately dewater trenches will be subject to rejection by the Engineer. The Contractor shall repair and/or replace the affected pipeline without additional compensation.

- C. Drainage Course Crossing Encasement: Any pipeline crossing a well-defined drainage course having less than three (3) feet of cover over the pipe shall be encased in concrete. The length of encasement shall be as shown on the Plans or if not shown as specified by the Engineer.

- D. Trench Shoring and Bracing: All shoring, bracing or blocking shall be furnished and installed as necessary to preserve and maintain exposed excavation faces, to protect existing improvements, to protect the proposed pipeline and to provide for safety.

Shoring or other methods for support of trench walls is the responsibility of the Contractor and shall be accomplished by methods that will not adversely affect pipeline alignment, grade and/or structural integrity.

All bracing, sheeting and/or shoring installed below a horizontal plane six (6) inches above top of proposed pipe shall not be disturbed or removed after pipe and/or pipe embedment has been installed unless otherwise specified. The bottom skids of a trench shield shall not extend lower than twelve (12) inches above top of proposed pipe.

- E. Pipe Embedments: All pipe embedment shall conform to Class B First Class Modified unless otherwise specified. Installation shall be in strict conformance with instructions for the appropriate Class being utilized.

- F. All Class A concrete embedments for rigid conduits shall begin and end at a pipe joint.

- G. Bedding Installation

1. The trench subgrade shall be prepared to provide a uniform and continuous pipe support between pipe bells and joints.

2. Place and densify embedment material by shovel slicing or vibrating and prepare embedment material so that the pipe will be true to line and grade after installation.
3. After each pipe has been brought to grade, aligned, and placed in final position, deposit and densify by shovel slicing sufficient bedding material under the pipe haunches and on each side of the pipe to hold the pipe in proper position during subsequent pipe jointing, bedding, and backfilling operations. Place bedding material uniformly and simultaneously on each side of the pipe to prevent lateral displacement.
4. Place pipe that is to be bedded in Class A (concrete) embedment in proper position on temporary supports consisting of wood blocks or bricks with wood wedges. When necessary, anchor or weight the pipe to prevent flotation when the concrete is placed.
5. Place concrete for Class A (concrete) embedment or encasement uniformly on each side of the pipe and deposit at approximately its final position. Do not move concrete more than five (5) feet from its point of placement.
6. If unstable subgrade conditions are encountered and it is determined by the Engineer that the bedding specified will not provide suitable support for the pipe, additional excavation to the limits determined by the Engineer will be required. This additional excavation shall be backfilled with material approved by the Engineer.
7. Pipe Embedment Designations and Descriptions
 - a. Class A. Embedment - Concrete Cradle. Arch or Encasement
 - i. All Class A embedments require a KCM MB 4K, except as otherwise specified. After initial set of concrete, one (1) foot of backfill material should be placed over the conduit or concrete. The backfill above this point shall not be placed nor sheeting removed until at least forty-eight (48) hours after placement of the concrete. Time requirements may be adjusted by the Engineer to obtain structural integrity.
 - ii. Class A embedments for all pipe shall be installed with reinforcing steel of not be less than $p = 0.4\%$, where p is the ratio of the area of steel to the area of concrete, or as otherwise specified. Reinforcing steel shall be uniformly spaced and have a minimum lap of sixteen (16) bar diameters.
 - b. Class B Embedment - The pipe shall be bedded in granular material, with a minimum thickness below the pipe as specified in Section 2103.
 - i. First Class: The granular material shall be placed to the horizontal center line of the pipe. The backfill from the horizontal center line to a level not less than twelve (12) inches above the top of pipe shall be carefully placed select earth backfill compacted to eighty-five percent (85%) of maximum density at an optimum moisture $\pm 2\%$ as defined in AASHTO T 99 or ASTM D 698. The select material shall be free from debris, organic matter, frozen material and rocks larger than one (1) inch. Class IV and Class V embedment materials, as defined in ASTM D 2321, shall not be used for bedding, haunching, or initial backfill of flexible pipe.
 - ii. First Class Modified: The backfill shall be the same as for First Class except all of the material used to a level not less than six (6) inches above the top of the pipe bell coupling shall be bedding aggregate.
 - iii. Class C Embedment The pipe shall be bedded in granular material with a minimum thickness beneath the pipe as specified in Section 2103.

It shall be sliced under the haunches of the pipe to a height one-sixth ($1/6$) of the outside diameter of the pipe. Backfill above the bedding to a point twelve (12) inches

above the top of pipe, shall be carefully placed select earth backfill compacted to eighty-five percent (85%) of maximum density as defined in AASHTO T 99 or ASTM D 698.

- H. Tees, Wyes and Building Service Lines: Tees, wyes, and building service lines shall be installed as shown on the Plans or specified herein.
1. Tees, wyes and saddles shall be installed at forty-five (45) degrees with pipe springline for pipe sizes 8 through 16 inch diameter. Tees, wyes and saddles shall not be installed in pipe sizes greater than or equal to eighteen (18) inch diameter.
 2. Building service lines shall be installed with a straight alignment and at a uniform grade not less than two (2) percent unless otherwise specified and shall be embedded with Class B embedment. When a building service line grade exceeds twenty (20) percent, pipeline anchors shall be installed as required under Section 2505.L, with the first anchor not more than twelve (12) nor less than seven (7) feet upstream of the tee or wye.
 3. The Contractor shall maintain an accurate record for submittal to the Engineer of location, size and direction of each tee, wye, saddle and/or location, size and length of each building service line. Locations shall use the pipeline stationing as shown on the Plans or the distance from the first downstream manhole. In the event such records are not kept or are lost before final acceptance of the work, the required information shall be redetermined by the Contractor at no additional cost to the Owner.
 4. Saddles will not be allowed unless approved by the Engineer.
 5. Service lines shall be terminated and capped one foot on the public side of Right of Way or easement lines.
- I. Gravity Sewers: All gravity sewers shall be installed to the alignment, elevation, slope, and with pipe embedment as specified and/or shown on the Plans. Maintain the following tolerances from true alignment and grade between adjacent manholes:

Alignment	6 inches
Grade	½ inch

Joint deflection shall not exceed the maximum allowable deflection per joint according to AWWA C 600. Only one correction for alignment and/or grade shall be made between adjacent manholes.

- J. Pressure Sewers (Force Main): All pressure sewers shall be installed with required pipe embedment to depths shown on the Plans (not less than 42 inches) and to a continuous slope when not shown. Approved air relief valves shall be installed at all locations shown on the Plans or where required by the Engineer.
- K. The Contractor shall block and anchor the pipeline to accommodate thrust and testing forces at pipe deflections, bends, tees, and plugs in accordance with the Contract Documents. All damage caused by the Contractor's failure to provide adequate thrust supports shall be corrected by the Contractor at no additional cost to the Owner.
- L. Anchors: Pipelines shall be anchored in accordance with the table below:

PIPELINE ANCHORS

Center to Center

<u>Percent of Grade</u>	<u>Max. Spacing (Feet)</u>
20 – 35	36
35 – 50	24
50	16

The anchor shall be of concrete or other material approved by the Engineer. Concrete anchors shall have a minimum thickness of twelve (12) inches. The anchor shall extend not less than one (1) foot into undisturbed earth on the sides and bottom and one (1) foot above top of pipe. In incompressible material, the above dimensions may be six (6) inches each side and bottom. The anchor shall support a joint fitting.

- M. Pipe Laying: All pipe shall be installed in accordance with the pipe manufacturer's recommendations, except as modified herein.
1. Pipe laying shall not proceed if the trench width as measured at the top of pipe exceeds the maximum allowable trench width. If this occurs, the Contractor shall submit to the Engineer for approval a better bedding for the pipe or a pipe that provides safe supporting strength.
 2. All pipe and fittings shall be stored and handled with care to prevent damage thereto. Do not use hooks to transport or handle pipe or fittings. Do not drop pipe or fittings.
 3. Rejected pipe and fittings shall be marked and removed from the Project Site at no cost to the Owner. All pipe and fittings shall be examined for soundness and specification compliance prior to placement in the trench, and rejected pipe or fittings shall not be incorporated into the pipeline. Check the class or pipe strength to be sure proper pipe is installed.
 4. Clean joint contact surfaces prior to jointing. Use lubricants, primers, or adhesives as recommended by the pipe or joint manufacturer.
 5. Pipe installation shall begin at the lowest point and precede uninterrupted upgrade without gaps unless otherwise approved, in writing, by the Engineer.
 6. Unless otherwise required, lay all pipe straight between manholes. Excavate bell holes for each pipe joint. When jointed, the pipe shall form a true and smooth pipeline.
 7. Pipe connecting to a structure shall be supported with Class A embedment, cradle or encasement to the first joint outside the structure excavation. If flexible wall connections are used, Class B embedment may be used in lieu of concrete embedment provided the height of backfill does not result in loads exceeding the pipe's safe supporting strength.
 8. All pipelines shall be plugged at the end of each day's progress. Plugs or other positive methods of sealing shall be utilized at all times to protect any existing system from entrance of storm water or other foreign matter.
 9. When a sanitary sewer line crosses an existing pipeline and the clearance is less than two (2) feet, special embedment may be required.
- N. Connection of Pipes of Dissimilar Materials: The connection of pipes of different materials shall be made using an approved transition coupling and shall provide a permanent and watertight connection that will withstand the hydrostatic test pressure and prevent the offset of the joint within the coupling.

2505.3 Detailed Installation Requirements

All pipes shall be installed in accordance with the following standards:

- A. ASTM D 2321 ADS Solid Wall, ADS Composite Wall
ASTM D 2321 PVC Solid Wall, PVC Composite Wall
- B. ANSI/AWWA C 600 Ductile Iron Pipe
- C. Reinforced Concrete Pipe: Installed in accordance with American Concrete Pipe Association's "Installation Manual"
- D. Fiberglass (Glass-Fiber-Reinforced Thermosetting-Resin) Wastewater Pipe
 - 1. Gravity Sewer: Installed in accordance with ASTM D 3839 Standard Guide for Underground Installation of "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pipe
 - 2. Force Main: Installed in accordance with AWWA Manual M45, Fiberglass Pipe Design
- E. High Density Polyethylene (HDPE) Joints: Assembled in accordance with ASTM D 2657 - Standard Practice for Heat Fusion Joining Polyolefin Pipe and Fittings

2505.4 Casing and Carrier Conduits

Casing and carrier conduits shall be installed at required locations by methods acceptable to the Engineer. Installation of the carrier conduit shall be completed prior to installation of the adjacent portions of the pipeline to allow for adjustments.

A. Casings Types

- 1. Steel Casing Pipe: Steel casing pipe is a flexible conduit and shall be designed to conform with one of the following design concepts (other methods may be submitted to the Engineer for approval).
 - a. Method A: The steel casing conduit is considered a temporary construction means for the installation of the carrier conduit; therefore cathodic and corrosion protection is not required provided that the carrier and its joints are structurally designed to withstand all possible loadings (live, earth and superimposed) which would otherwise be supported by the casing conduit, and to withstand all pressures necessary to install the required grout. All exterior voids around the casing conduits shall be filled with casing conduit grout (see Section 2502.5.E). Interior void between the carrier and casing conduits shall be filled with sand conforming to ASTM C33. Sand shall be applied under pressure to fill all of the voids without adversely affecting the carrier conduit, joints, alignment and grade.
 - b. Method B: The steel casing conduit is considered a permanent installation to protect the carrier conduit and to support all loads; therefore cathodic and corrosion protection and watertight removable end seals are required for the casing conduit. Care shall be exercised to prevent the carrier conduit from floating and receiving any load transfer from the casing conduit unless it is designed for such loading. The void between casing and carrier conduits shall be treated as shown on the Plans or Standard Drawings. Cathodic and corrosion protection for method B shall be provided by two magnesium anodes, one at each end of the casing pipe, with a lead wire connected to the encasement pipe by thermite welding.
- 2. Reinforced Concrete Casing Pipe: Reinforced concrete casing pipe is a rigid conduit and shall be installed in accordance with recommended procedures in the latest printing of the Concrete Pipe Design Manual prepared by American Concrete Pipe Association.

- B. Casing Installation: Installation of casing shall be supervised by a foreman experienced in such work. Casing shall be installed by a combination of augering and jacking. Alignment and gradient shall be such that the carrier conduit can be installed to line and grade shown on the Plans.

Welding shall be performed by a person experienced with the type of welding necessary. All welds shall conform to AWWA C 206.

- C. Liner Plate Installation: Liner plates shall be assembled immediately following the excavation. Advance liner plates or casing continuously with excavation. All voids between liner and surrounding earth shall be filled with casing conduit grout forced in under pressure. As the pumping through any hole is completed, it shall be plugged to prevent the back-flow of grout. After lining installation is complete, it shall be cleaned of all debris and all leaks sealed.
- D. Carrier Conduit Installation: After completion of the installation of the casing, the carrier conduit shall be carefully pushed or pulled through the casing in a manner that will maintain proper jointing of the pipe joints and provide required gradient and alignment. Pipe skids shall be provided as indicated on the Plans. The skids shall be securely strapped to the pipe with steel strapping material at least three-quarters (3/4) inch wide.
- E. Sand Fill: The annular space between lining and sewer pipe shall be filled with sand from end seal to end seal unless otherwise specified. The fill shall be placed inside the casing in a manner that will not disturb the alignment and/or grade of the sewer pipe. Sand used in casing conduits shall be as specified in ASTM C33. Sand shall be blown into the casing so that all space is filled.
- F. End Seals: Construct end seals after sewer pipe has been installed and approved. End seals shall be manufactured end seals, concrete plugs with allowances for water flow, or brick shall be in accordance with ASTM C 32, Grade SS or SM and mortar in accordance with ASTM C 270.
- G. Initial Testing: Air pressure and/or exfiltration test as required shall be successfully performed on the carrier conduit prior to filling the void between casing and carrier conduits with sand or the sealing of the ends of the casing conduit.
- H. Carrier Conduit Installed Without Casing: Carrier conduits installed without casing shall be assembled at the entrance to the auger hole and carefully pushed or jacked through the opening using a method designed to prevent disturbing the assembled joints. Auger holes shall be sized to accommodate the carrier conduit with a minimum of annular space around the conduit. When finally in place, carrier conduit shall be true to the line and grade required on the Plans.

SECTION 2506 BACKFILL

2506.1 Scope

This section governs the furnishing of all labor, materials and equipment to properly backfill trenches and structures as shown on the Plans and in accordance with the Standard Drawings, the specifications and the Special Provisions.

2506.2 General

Trench backfill shall be in accordance with Section 2102.4.I except as modified herein.

2506.3 Backfilling in Street or Alley Right of Way and Under Pavement

Backfill under areas to be paved shall be in accordance with Section 2102.4.J.

2506.4 Backfill Around Structures

- A. No backfill shall be placed over or around any structure until the concrete or mortar has attained a minimum strength of 2000 psi and can sufficiently support the loads imposed by the backfill without damage.
- B. The Contractor shall use utmost care to avoid any wedging action between the side of the excavation and the structure that would cause any movement of the structure. Any damage caused by premature or unbalanced backfill or by the use of equipment on or near a structure will be the responsibility of the Contractor.
- C. No rock larger than three (3) inches maximum dimension shall be placed within one (1) foot of the exterior surface of any structure.
- D. Backfill around structures in street or alley Right of Way from the bottom of the structure to the bottom of the subgrade shall meet the requirements of Section 2102.4.J.

SECTION 2507 RESTORATION

2507.1 Scope

This section governs the furnishing of all labor, materials and equipment for the surface restoration of private and public properties that are disturbed by construction as shown on the Plans and in accordance with the Standard Drawings, the specifications and the Special Provisions.

2507.2 General

The Contractor shall restore the project site to conditions equal to or better than those existing prior to entry unless otherwise specified.

- A. Maintain adequate safety signs, barricades and lights until final restoration of work area is completed.
- B. Public property shall be restored to the requirements of the Unified Government of Wyandotte County.

2507.3 Clean-Up

The Contractor, upon completion of installation and backfill operations, shall prepare the area for final grading including but not limited to the following items:

- A. Clean-up shall follow the backfilling operations as closely as possible.
- B. Excess material shall be removed from the site including material that has washed into the stream beds, storm water facilities, streets, etc.
- C. Tools, equipment and construction material shall be removed except for in designated storage areas along the pipeline route.
- D. Restore surface and sub-surface drainage and provide temporary erosion control measures in accordance with Section 2150.

2507.4 Finished Grading

The Contractor shall finish grade the area to lines and grades shown on the Plans or if not shown to those that existed prior to the area being disturbed. Special attention shall be directed to assure surface drainage. The area shall be smoothed by raking or dragging.

2507.5 Seeding

Seeding shall be in accordance with Section 2400.

2507.6 Sodding

Sodding shall be in accordance with Section 2400.

2507.7 Pavement Replacement

- A. General

1. Replacement of pavement shall proceed in accordance with the traffic control plans and/or approved construction schedule.
2. Prior to pavement replacement, all edges that were previously cut but have been subsequently damaged shall be recut and all adjacent undermined and heaved pavement shall be removed.
3. Removed pavement shall be replaced in conformance with the requirements of applicable portions of Section 2200 "Paving" or Section 2300 "Incidental Construction".
4. Non-Standard Pavement: Pavement sections not conforming to Section 2200 of these specifications shall be replaced in accordance with requirements of the Unified Government of Wyandotte County.

2507.8 Fences

See Section 2307.

2507.9 Walls

Retaining and architectural walls, if disturbed or damaged, shall be restored architecturally and structurally to conditions not less than that which existed prior to construction.

2507.10 Trees, Shrubs, and Bushes

Any tree, shrub, or bush as shown on the Plans as "replaced" shall be of the same species as the removed tree, shrub, or bush. Any tree, shrub, or bush species that is prohibited by local restrictions shall be substituted with a related species. Replacement planting shall conform to the guidelines ANSI-Z60.1-2004 "American Standard for Nursery Stock" specified by the American Nursery and Landscape Association.

SECTION 2508 TESTING

2508.1 Scope

This section governs the furnishing of all labor, materials and equipment for the performance of any and all acceptance tests as shown on the Plans and in accordance with the Standard Drawings, the specifications and the Special Provisions.

2508.2 General

The Contractor shall furnish all labor, equipment, materials and reports for the required acceptance tests. All pipelines, including building service lines, shall undergo and pass all required tests to determine soundness and workmanship. Pipelines that do not conform to the project requirements shall be repaired and/or replaced and shall be retested until the pipeline meets the project requirements. Test results shall be recorded by the Contractor and a copy shall be submitted to the Engineer. No testing of the piping system shall be performed before backfill and compaction operations have been completed.

2508.3 Alignment and Grade

Alignment, grade and visible defects shall be checked as follows:

- A. Visual Internal Inspection
 - 1. Contractor shall clean pipe of excess mortar, joint sealant and other dirt and debris prior to inspection.
- B. Television Inspection: Sewer line installations shall be inspected by closed circuit television at the Contractor's expense.

2508.4 Infiltration - Exfiltration

Hydrostatic or air pressure tests shall be conducted on sewers before acceptance by the Owner. For sewers with a diameter less than twenty-four (24) inches, the infiltration-exfiltration shall not exceed fifty (50) gallons per day per inch of nominal diameter per mile of sewer line for any section of the system. For sewers with a diameter twenty-four (24) inches or greater, infiltration-exfiltration shall not exceed three thousand six hundred (3600) gallons per day per mile of pipe.

- A. Infiltration: Where sewers are laid within the ground water table, infiltration testing shall be conducted. Where evidence of infiltration is discovered by the Engineer, the Contractor shall install weirs or other suitable flow rate measuring devices adequate to determine to the satisfaction of the Engineer that the specified infiltration limit is not exceeded for that section of gravity sewer. Where the specified infiltration limit is exceeded, the Contractor shall repair or replace the defective section of pipeline at no additional cost to the Owner. Following repair of the pipeline, the Contractor shall remeasure infiltration flow rates and make additional repairs until an acceptable infiltration flow rate is achieved.
- B. Exfiltration: Exfiltration tests shall be performed by the Contractor using one or a combination of methods as set forth below. Each section of gravity pipeline between manholes and/or structures shall be tested after backfill has been completed.
 - 1. Hydrostatic Tests for Gravity Systems
 - a. Test section shall be filled not less than twelve (12) hours prior to testing. Refill test section prior to performing test.

- b. Perform at depths of water as measured above center line of pipe of not less than 2 feet nor more than 10 feet (consideration shall be given for water table above said center line). Maintain test as necessary to locate all leaks but not less than two hours.

2. Hydrostatic Tests for Pressure Systems

- a. Conformance Procedure: Perform hydrostatic pressure and leakage tests. Conform to AWWA C 600 procedures as modified herein. Tests shall apply to all pressure sewers.
- b. Sectionalizing: Test in segments between sectionalizing valves, between a sectionalizing valve and a test plug, or between test plugs. Contractor shall furnish and install test plugs at no additional cost to the Owner, including all anchors, braces, and other devices to withstand hydrostatic pressure on plugs. Contractor shall be responsible for any damage to public or private property caused by failure of plugs. Limit fill rate of line to available venting capacity.
- c. Pressure Test: Conduct at 1.5 times maximum operating pressure determined by the following formula:
$$P_{pt} = (1.5) (.433) (OP-GE), \text{ in which}$$

Ppt = test pressure in psi at gauge elevation

OP = operating pressure in feet as indicated for highest elevation of the hydraulic gradient on each section of the line

GE = elevation in feet at center line of gauge.

Perform pressure tests satisfactorily prior to determining leakage.
- d. Leakage Test: Conduct at the maximum operating pressure as determined by the following formula:
$$P_{lt} = 0.433 (OP-GE), \text{ in which}$$

Plt = test pressure in psi at gauge elevation

OP and GE – as defined from pressure test formula (see above)

All joints shall be watertight and free from leaks

3. Air Testing of Gravity Systems

- a. Contractor may perform air tests for all pipe (except concrete and fiberglass) for all sizes.
- b. Furnish all facilities required including necessary piping connection, test pumping equipment, pressure gauges, bulkheads, regulator to avoid overpressurization, and all miscellaneous items required.
- c. The pipe plug for introducing air to the sewer line shall be equipped with two taps. One tap will be used to introduce air into the line being tested through suitable valves and fittings, so that the input air may be regulated. The second tap will be fitted with valves and fittings to accept a pressure test gauge indicating internal pressure in the sewer pipe. Additional valve and fitting will be incorporated on the tap used to check internal pressure so that a second test gauge may be attached to the internal pressure tap. The pressure test gauge will also be used to indicate loss of air pressure due to leaks in the sewer line.
- d. The pressure test gauge shall meet the following minimum specifications:

Size (diameter)	4.5 inches
Pressure Range	0 -15 psi
Figure Intervals	1 psi increments
Minor Subdivisions	0.05 psi
Pressure Tube	Bourdon Tube or diaphragm
Accuracy	± 0.25% of maximum scale reading
Dial	White coated aluminum with black lettering, 270° arc and mirrored edge
Pipe Connection	Low 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 Engineer whenever air tests are performed.

Gravity sewer pipe shall be air-tested in accordance with the requirements of ASTM F 1417.

- e. Plug ends of line and cap or plug all connections to withstand internal pressure. One of the plugs provided must have two taps for connecting equipment. After connecting air control equipment to the air hose, monitor air pressure so that internal pressure does not exceed 5.0 psig. After reaching 4.0 psig, throttle the air supply to maintain between 4.0 and 3.5 psig for at least two (2) minutes in order to allow equilibrium between air temperature and pipe walls. During this time, check all plugs to detect any leakage. If plugs are found to leak, bleed off air, tighten plugs, and again begin supplying air. After temperature has stabilized, the pressure is allowed to decrease to 3.5 psig. At 3.5 psig, begin timing to determine the time required for pressure to drop to 2.5 psig. If the time in seconds for the air pressure to decrease from 3.5 psig to 2.5 psig is greater than that shown in the table below, the pipe shall be presumed free of defects.

f.

Pipe Diameter (in)	Minimum Time (min:sec)	Length for Minimum Time (ft)	Time for Longer Length (sec) L = Total Length
4	3:46	597	0.380 * L
6	5:40	398	0.854 * L
8	7:34	298	1.520 * L
10	9:26	239	2.374 * L
12	11:20	199	3.418 * L
15	14:10	159	5.342 * L
18	17:00	133	7.692 * L
21	19:50	114	10.470 * L
24	22:40	99	13.674 * L
27	25:30	88	17.306 * L
30	28:20	80	21.366 * L
33	31:10	72	25.852 * L
36	34:00	66	30.768 * L
42	39:48	57	41.883 * L
48	45:34	50	54.705 * L

If air test fails to meet above requirements, repeat test as necessary after all leaks and defects have been repaired and backfilled. Prior to acceptance, all constructed sewer lines shall satisfactorily pass the low pressure air test.

- g. If the maintenance of existing flow in a pipe is necessary and air pressure testing is not

possible, the Contractor shall perform closed circuit television inspection of the pipe at the Contractor's expense.

4. In areas where ground water is known to exist, install a one-half inch diameter capped pipe nipple approximately 10" long through manhole wall on top of one of the sewer lines entering the manhole. This shall be done at the time the sewer is installed. Immediately prior to the performance of the line acceptance test, ground water level shall be determined by removing pipe cap, blowing air through pipe nipple into the ground so as to clear it, and then connecting a clear plastic tube to pipe nipple. The hose shall be held vertically and a measurement of height in feet of water shall be taken after the water stops rising in this plastic tube. The height in feet shall be divided by 2.3 to establish the pounds of pressure that will be added to all readings.

2508.5 Deflection Test

A. General: Flexible pipelines shall be tested for deflection by pulling a mandrel through the entire length thereof.

1. The mandrel (go/no-go) device shall be cylindrical in shape and constructed with nine (9) evenly spaced arms or prongs. Mandrels with fewer arms will be rejected as not sufficiently accurate. The 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 per appropriate standard. Statistical or other "tolerance packages" shall not be considered in mandrel sizing. The dimensions of the mandrel for PVC pipe shall be as listed in the accompanying table. The "D" mandrel dimension shall carry a tolerance of ± 0.01 inch. Allowances for pipe wall thickness tolerances or ovality (from heat, shipping, poor production, etc.) shall not be deducted from the "D" dimension but shall be counted in as a part of the five (5) percent or lesser deflection allowance. Contact length (L) shall be measured between points of contact on the mandrel arm. The length shall not be less than as shown in the accompanying table.
2. The Engineer shall be responsible for approving the mandrel. Proving rings shall be used to verify this.
3. 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 Owner, shall reround or replace the sewer to the satisfaction of the Engineer. These repaired sections shall be retested.
4. The testing shall be conducted after final trench backfill has been in place for a minimum of 30 days, unless approved otherwise by the Engineer.

D and L Dimensions For 9 Arm Mandrel			
L	D		
Nominal Diameter	ASTM D3034 SDR 35	ASTM D3034 SDR 26	ASTM D2241 SDR 21
8"	7.52"	7.37"	7.41"
10"	9.40"	9.21"	9.24"
12"	11.19"	10.96"	10.96"
15"	13.70"	13.42"	N/A
18"	16.76"	N/A	N/A
21"	19.74"	N/A	N/A
24"	22.21"	N/A	N/A
27"	25.03"	N/A	N/A

5. Mandrel outside diameters for flexible pipe types not listed in the table shall be calculated as described in paragraph 2508.5.A.1 above.
6. Mandrel outside diameters for HDPE and Fiberglass Wastewater Pipe shall be calculated as described in paragraph 2508.5.A.1 above. For Fiberglass Wastewater Pipe, the outside diameter of the mandrel shall be 97% of the inside diameter of the pipe.

2508.6 Soil Density Tests

- A. General: Compaction tests shall be performed as specified in Section 2102.4.I and 2102.4.J.

SECTION 2509 MANHOLES AND SPECIAL STRUCTURES

2509.1 Scope

This section governs the furnishing of all labor, materials and equipment and the performance of all work incidental to the construction of manholes, drop manholes and special sewer structures complete with covers, steps, fittings and appurtenances as shown on the Plans and in accordance with the Standard Drawings, the specifications and the Special Provisions.

2509.2 General

As used herein special structures refers to manholes on large sewers, special junction structures, metering stations and similar structures constructed on the pipeline.

Manholes and special structures may be constructed of pre-cast concrete sections or cast-in-place concrete, unless otherwise noted on the Plans, Standard Drawings, or Contract Documents.

2509.3 Manhole Materials

- A. Mortar and plaster coating: Mortar and plaster coatings for masonry manhole units shall conform to ASTM C 270. The mix shall consist of two (2) parts portland cement to one (1) part masonry cement to six (6) parts standard plaster sand. No mortar or plaster mixed more than thirty (30) minutes shall be incorporated in the work.
- B. Non-Shrink Grout: Non-shrink grout shall be in the plastic state and show no expansion after set as tested in accordance with ASTM C 827 and shall develop compressive strength not less than three thousand (3,000) pounds per square inch with a trowelable mix within twenty-four (24) hours per ASTM C 109. The placement time shall be not less than forty-five (45) minutes based on initial set per ASTM C 191.
- C. Waterproofing: Waterproofing shall be a coal-tar coating and conform to ASTM D 450. Where specified, exterior surfaces shall be coated with Tnemec "46-450 Heavy Tnemecol" or approved equal. Where specified, interior surfaces (which are exposed to raw sewage and sulfide gases) shall be coated with Tnemec "46-449 Heavy Duty Black" or approved equal. The minimum dry thickness for all waterproofing shall be 14.0 mils.
- D. Precast Concrete: Precast concrete manholes shall conform to ASTM C 478 with the following modifications.
 - 1. Wall thickness shall not be less than one-twelfth (1/12) of inside diameter plus one (1) inch or five (5) inches, whichever is greater.
 - 2. Cement, Fine Aggregate, Coarse Aggregate and Water used in the manufacture of precast manholes shall be as specified in Section 2509.3.E.
 - 3. Developed bases shall be used where practical. The floor of developed base manholes shall have a minimum thickness of twelve (12) inches. The bottom wall section shall be embedded a minimum of five (5) inches into the cast base. The diameter of the base pad shall be eight (8) inches greater than outside diameter of the manhole.
 - 4. Pipe openings: The first riser (barrel) section shall be provided with circular openings with continuous, circular, resilient connectors cast into the riser wall. Horseshoe-shaped boxouts, or doghouses, shall not be allowed except when approved by the Engineer. Flexible gaskets shall be used with developed base manholes. Flexible gaskets shall be A-Lock, PSX, or approved equal.

5. The minimum distance from the invert of the downstream pipe to the top surface of the base shall be four (4) inches minimum.
 6. Joints between manhole sections, adjustment rings, and below the ring and cover shall be sealed with preformed bitumastic sealants, Kent-Seal, RamNet, E-Z Stick or approved equal. The minimum bead dimension shall be one inch.
 7. Exterior manhole joints shall be sealed by the following methods:
 - a. Cold Applied: Joints on the manholes shall be wrapped with a Butyl Joint Wraparound Sleeve: The butyl component of the wrap shall consist of 50 percent minimum butyl rubber and shall contain 2 percent or less of volatile matter, and shall be 9" wide by 0.03" inch thick. The backing component shall be EPDM or Intra-Curing Halogenated Based Rubber that is a minimum of 0.03" thick. A release paper may be used. The butyl rubber-based wrap shall be EZ-Wrap Rubber as supplied by Press-Seal Gasket Corporation, Gator Wrap as manufactured by Sealing Systems, Inc. or approved equal.
 - b. Heat Applied: Heat Shrinkable Wraparound Sleeves: The wrap system shall consist of a two-piece sleeve (backing and adhesive) with a closure system and a G-type primer. It shall consist of an irradiated cross-linked polyefin sheeting, pre-coated with a layer of anti-corrosion adhesive. The backing shall have a minimum recovery of 22 percent. The wrap shall have a mastic type adhesive, specially formulated to become fluid at temperatures achieved during installation and maintain flexibility in cold climates with installation temperatures down to -40° F. Upon cooling the adhesive shall form a tough, elastomeric protective layer. The wrap shall employ a closure seal to allow sealing of the overlap area. The overall thickness of an applied sleeve shall nominally measure 0.01 inch. The heat shrinkable wraparound sleeves shall be Wrapid Seal as manufactured by Canusa or approved equal.
 8. Chimney Seals: An external flexible rubber frame seal and where necessary, extension or extensions to seal entire chimney of all sanitary sewer manholes. The seal and extensions shall seal all joints from the base flange of the frame down to the top of the cone. The seal shall be a continuous seamless band made of high quality EPDM rubber with a minimum thickness of 65 mils or a heat-shrinkable sleeve. The top section of the seal shall extend 3" attaching to the casting base/flange with the side section covering over the entire grade adjustment ring area and onto the cone section a minimum of 2". Installation of Chimney Seals shall be per the manufacturer's recommendations and these instructions shall be supplied to the inspector on each project. The seal shall be: Infi-Shield by Sealing Systems Inc., Cretex Classic External Seal or Wrapid Seal as manufactured by Canusa.
 9. Both the bell and spigot ends of the manhole sections shall be primed with a liquid primer that is compatible with bitumastic sealants, Kent-Seal, RamNet, E-Z Stick or approved equal.
 10. Reducing sections may be used at six (6) feet or more above the invert for special circumstances, if approved by the engineer.
 11. Eccentric cone sections shall be used unless noted otherwise on the Plans.
- E. Manhole and Special Concrete: Manhole and special concrete shall conform to KCM MB mix as shown on the Plans or as specified herein.
1. Standard Concrete: Standard concrete used for concrete encasements and embedments, thrust blocks, pipe anchors, pipe collars, etc. shall be KCM MB 3K unless otherwise specified.

2. Structural Concrete: Structural concrete used for aerial crossing piers, wetwell walls, manhole walls, bases, inverts, and flat slabs, etc. shall be KCM MB 4K, unless otherwise specified.
 3. Concrete Materials and Admixtures
 - a. For KCM MB mixes, concrete shall be an approved mix with admixtures that are approved for use in that mix design.
- F. Reinforcement steel: Reinforcement steel shall conform to the following minimum requirements and as shown on the Plans or Standard Drawings.
1. Design: Reinforcing steel shall conform to one of the following.
 - a. Welded Wire Fabric - ASTM A 1064.
 - b. Reinforcing Bars - ASTM A 615, Grade 40, or Grade 60.
 - c. Fabricated Steel Bar and Rod Mats - ASTM A 184, Grade 40, or Grade 60.
 2. Fabricating Tolerances: Tolerances for concrete reinforcement shall conform to the following requirements.
 - a. Sheared length = ± 1 inch.
 - b. Stirrups, ties, and spiral = ± 2 inches.
 - c. All other bends = ± 1 inch.
- G. Iron Castings: Casting shall conform to the requirements of ASTM A 48, Class 30B. Castings shall be clean and without surface defects that will impair serviceability. Plugging or filling of holes or other defects will not be permitted. Parting fins and pouring gates shall be removed.
1. Rings and Covers: Rings and covers shall meet the following minimum requirements.
 - a. Bearing surfaces between the ring and cover shall be machine finished or ground to assure interchangeability and a non-rocking fit in any position.
 - b. Provision shall be made for opening, such as concealed pick hole(s).
 - c. Bolt-down type manhole rings shall be anchored to the manhole walls with not less than four (4) three-fourths (3/4) inch diameter steel bolts embedded a minimum of four (4) inches, except where the entire ring is embedded in a concrete top slab.
 - d. Rings and bolt-down covers shall be provided with machined surfaces, O-ring gaskets and five-eighths (5/8) inch hex head brass cover bolts. Cover bolt heads shall fit flush or below the top of the cover. The O-ring rubber gasket shall be neoprene or other synthetic, sixty (60) plus or minus five (5) hardness when measured by ASTM D 2240 type Durometer.
 2. Steps
 - a. Cast-Iron Steps are not allowed.
 - b. Steel core, plastic coated steps: Steel core plastic coated steps shall meet the following minimum requirements.
 - i. The plastic coating shall be a copolymer polypropylene meeting ASTM D 4101.
 - ii. The steel core shall be a minimum of 1/2 inch in diameter and Grade 60.
 - iii. The requirements of ASTM C 478 shall be met except minimum pull-out strength shall be 1,000 pounds.

2509.4 Manhole Site Preparation

Manhole site preparation shall be governed by Section 2503.

2509.5 Manhole Excavation

- A. Excavation: Excavation for manholes and special structures shall be governed by this section and Section 2504. It shall be achieved in a suitable and orderly manner providing a minimum disturbance to the general public.
- B. Depth of Excavation: Depth of excavation shall be to that required for proper installation of the manhole or structure. Over-depth excavation may be required by the Engineer if the subgrade is unstable. Over-depth excavation due to unstable subgrade shall be backfilled as required by the Engineer. Over-depth excavation occurring through an oversight by the Contractor shall be backfilled as required by the Engineer at no additional cost to the Owner.
- C. Side Clearances: Side clearances outside the manhole and/or structures shall be no greater than to allow for forming, connection of piping, proper application of special coatings, if required, and to permit inspection. When concrete is to be placed directly against excavated faces, excavation shall be sufficiently outside of the manhole or structure to provide not less than three (3) inches of concrete cover over the steel reinforcement.

2509.6 Manhole Installation

Manhole installation shall be governed by this Section and Section 2505. It shall be performed by the Contractor on a schedule that will provide an orderly progression of the work.

- A. Bases
 - 1. Precast developed bases shall be reinforced in accordance with ASTM C 478.
 - 2. If preferred developed bases are not used, poured concrete bases shall be used. Developed bases shall be installed on a maximum of 4 inches of crushed rock. Depths exceeding this amount shall be filled with mass concrete.
 - 3. Poured-in-place bases shall have a minimum thickness of eight (8) inches. When poured-in-place bases are used, the invert shall be poured monolithically with the base. The bottom wall sections shall be embedded in the base section a minimum of three (3) inches. The bottom precast wall section shall not be set upon a previously poured base. Solid concrete blocks shall be used for supporting and leveling the wall section prior to pouring the base.
- B. Inside Dimensions: The minimum horizontal clear distance in the barrel of the manholes shall not be less than four feet unless otherwise specified on the Plans.
- C. Brick shall not be used for new manhole construction.
- D. Precast
 - 1. Delivery: Precast concrete components shall not be delivered to the job until representative concrete control cylinders have attained at least 80 percent of the specified minimum design strength.
 - 2. Inspection: Precast concrete shall be inspected when delivered. Rejection of defective or cracked precast concrete components shall be in accordance with ASTM C 478.

3. Wall Thickness: Wall thickness shall conform to the requirements of Section 2509.3.D.
 4. Construction: Precast sections shall be cleaned of all dirt, grass, and other deleterious matter. Seal each joint (including adjustment rings and castings) with a double bead of preformed bitumastic joint sealant sections shall be placed such that steps are aligned but without rotation or damage to sealant integrity. Lift holes shall be patched with non-shrink grout.
- E. Cast-In-Place
1. Wall Thickness: Wall thickness shall conform to the dimensions as shown on the Plans or Standard Drawings.
 2. Construction: Reinforcement steel shall be placed as shown on the Plans or Standard Drawings. Tie-holes shall be patched with non-shrink grout. Wall sleeves, where required, shall be installed as shown on the Plans or Standard Drawings. Water stops shall be installed at the wall and slab connection and shall be of the size, thickness and material as shown on the Plans or Standard Drawings.
 3. Waterproofing: Interior protective coatings, where required, shall conform to the material specifications of Section 2509.3.C. Application shall conform to the manufacturer's recommendation.
- F. Top Slabs: Thickness shall conform to the dimensions and reinforcement steel shall be placed as shown on the Plans or Standard Drawings.
- G. Pipe Stubs: Stubs shall be installed at the locations, angles, elevations and of the materials as shown on the Plans or Standard Drawings. A water-tight removable stopper shall be installed in each pipe stub. Pipe stubs shall be installed so that a pipe joint will be two (2) feet or less from the outside manhole wall.
- H. Inverts: Inverts shall be structural concrete and steel-troweled to produce a dense, smooth finish. The invert channel shall be "U" shaped in cross-section and extend upward one-half of the inside pipe diameter. Smooth transitions shall be formed for pipes of different sizes, elevation and bends. The invert bench shall be sloped to drain.
- I. Steps: Steps shall be aligned vertically below the casting and spaced at sixteen (16) inch centers. The top step shall be not more than one (1) foot below the top of the cone. The lowest step shall be not more than two (2) feet above the invert bench. Field drilled step holes are not permitted in precast concrete manholes.
- J. Top Elevation: The finished top elevation of manhole castings shall conform to the following unless otherwise shown on the Plans or directed by the Engineer.
1. In paved or future paved areas, the top of the casting shall conform to the slope of the pavement and be 1/8 inch below the finished pavement elevation.
 2. In non-pavement areas, the top of the casting shall be not more than six (6) inches above the surrounding ground or less than the sod's upper root limit. The final elevation shall be at a point where water will not pond over the manhole cover.
- K. Manhole Adjustment: All new manholes will be provided with adjustment ring(s) underneath the casting as shown on Plans. The joints shall be sealed with preformed bitumastic sealant. The maximum allowable adjustment distance between the top of the cone and the bottom of the casting shall be 12 inches. If the top of an existing manhole is required to be raised to an elevation that will exceed the maximum adjustment distance or lowered more than the adjustment rings will allow, all vertical adjustments shall be made to the barrel of the manhole.

- L. Castings: Castings shall be installed with the mud ring inserted inside the manhole opening and resting on a minimum of two rows of preformed bitumastic seals. Bolt-down castings shall be held in place as shown on the Plans or Standard Drawings.

2509.7 Manhole Backfilling

Manhole backfilling shall be governed by Section 2506.

2509.8 Restoration

Restoration shall be governed by Section 2507.

2509.9 Manhole Testing

- A. Scope: This section governs the furnishing of all labor, materials for the required testing of manholes and structures as shown on the Plans and in accordance with the Standard Drawings, the specifications and the Special Provisions.
- B. General: All manholes shall be tested for infiltration and inflow.
- C. Infiltration and Inflow Testing: All manholes shall be vacuum tested in the presence of the Engineer.
1. Each manhole shall be tested after backfilling to, at least the level of the bottom adjustment ring.
 2. The vacuum test shall include testing of the seal between the cast iron frame and the concrete cone, slab or top adjustment ring.
 3. All pipes entering the manhole shall be plugged at least eight inches into the sewer pipe. The plug must be inflated at a location beyond the manhole/pipe gasket.
 4. All plugs shall be adequately braced to prevent the plug or pipe from being dislodged and drawn into the manhole.
 5. A vacuum of at least 10.5 inches of mercury shall be drawn on the manhole. Shut the valve on the vacuum line to the manhole and disconnect the vacuum line. Open the vacuum line valve and adjust the vacuum to 10 inches of mercury.
 6. The pressure gage shall be liquid filled having a 3.5-inch diameter face with a reading from zero to thirty inches of mercury.
 7. The time for the vacuum reading to drop from 10 inches of mercury to 9 inches of mercury must be equal to or greater than the following values for the manhole to be considered as passing the vacuum test:

<u>Manhole Depth</u>	<u>Time (minutes)</u>
10 feet or less	2
10.1 to 15 feet	2.5
15.1 to 25 feet	3

8. If a manhole fails the vacuum test the manhole shall be uncovered and the leak repaired by patching

the exterior of the manhole. The manhole shall then be backfilled and re-tested.

9. The vacuum testing of manholes shall be done prior to air testing the sewer lines that enter or exit the manhole.

2509.10 Lining Existing Manhole

This Section covers repair of existing manhole by placement of a cementitious lining. Topics include product and installer qualifications, manhole cleaning, manhole and invert patching, lining, and exfiltration tests.

A. Acceptable Vendors:

1. Coating materials for use in lining standard environment existing manholes shall be AP/M Permaform PERMACAST MS-10,000; Strong Systems, Inc. MS-2A; Master Builders, Inc. Emaco S88C; Standard Cement Materials, Reliner MSP; Quadex QM-1s Restore, or approved equal.
2. Coating materials for use in lining corrosive environment existing manholes shall be AP/M Permaform COR+GARD; Aquafin, Inc. Hydro-Pox 212 GL; De Neef Construction Chemicals, Inc. Denepox Sewergel; Raven Lining Systems AquataPox Systems or Raven 400 Series; Sauereisen, Inc. Sewergard No. 210RS, or approved equal.

- B. Environmental Limits: Product shall not be placed on surfaces with below freezing temperature, or if surface may experience below freezing temperature within 24 hours after application. When air temperatures exceed 90° F, chill mix to maintain mix temperature below 85° F.

- C. Component Compatibility: All equipment, materials, application methods, and installer training shall be approved for the application by the manufacturer of the lining material.

- D. Submittals: Contractor shall submit for review including, but not limited to, the following:

1. Lining material product data sheet and information.
2. Manufacturer's application procedure and recommended application equipment.
3. Certification that the coating system materials furnished comply with all requirements specified herein.

- E. Installer Qualifications: The firm shall be certified or licensed by the manufacturer of the lining material to have equipment and training recommended to prepare the manhole and to apply the specified coatings.

F. Products

1. Patching and Leak Control Materials: Material for patching of manholes shall be a quick setting, non-shrink, material at least as strong as the liner material and produced or recommended by the lining manufacturer. Selection of actual patch product, if any, shall be based on field conditions
2. Liner Material:
 - a. Material for standard environment spray-on lining shall be a pre-blended mixture of cements, chemically active aggregates, fiber reinforcements, and other additives specifically selected for their special properties and formulated for spray application. No material (other than potable water) shall be used with or added to the approved design mix without prior approval or recommendation from the lining manufacturer and Engineer. All water used in the mixture shall be clean and potable. The density of the material at placement of the coating shall not

be less than 95 pounds per cubic feet. Approximate working time of the material after initial application shall be 30 minutes. Material shall meet the following requirements for the strength class required:

Test	Normal	Method
Compressive Strength	3000 psi, 24-hours	ASTM C109
Flexural Strength	1200 psi, 28-day	ASTM C348
Shrinkage at 90% relative humidity	0 percent	ASTM C596
Bond Strength	130 psi, 28-day	ASTM C952
Freeze-Thaw	No visible damage after 100 cycles	ASTM C666
Permeability	Shall not exceed 450 Coulombs	ASTM T277

- b. Material for corrosive environment lining shall be a 100% solids, solventless two-component epoxy resin system suitable for spray or trowel application. Products shall be mixed and applied as recommended by manufacturer and approved by Engineer.
 3. Installation Equipment: Application equipment shall be manufactured or licensed by the material supplier and designed specifically for the application of manhole liners. Minimum pumping pressure shall be 250 psi. High-pressure water spray for surface cleaning shall reach minimum 3500 psi.
- G. Execution
1. Bypass Pumping: See Related Work in the section.
 2. Manhole Preparation: Invert and service lines shall be covered to prevent waste material from entering lines. Foreign material shall be removed from wall and bench by high-pressure water spray. Loose or protruding brick, mortar, or concrete shall be chipped out. Large voids and active leaks shall be patched and plugged.
 3. Invert Repair: Inverts with visible damage or infiltration shall be repaired. Contractor shall block flow and clean invert. Patch material shall be applied a minimum of 1/2-inch thick over the entire invert and shall extend onto the bench sufficiently to tie to subsequent liner placement.
 4. Liner Application: Material shall be mixed and applied using the procedure and equipment approved and licensed by the lining manufacturer. Surface to receive lining shall be saturated but free of water drops. Liner shall be sprayed on following manufacturer's recommendations. Spray material to a minimum 1-inch uniform thickness to ensure that all voids and crevices are filled and a smooth surface remains after troweling. Trowel to compact material into voids and crevices and to "set" the bond on the manhole surface. Below 12 feet, minimum liner thickness shall be 1-1/2-inches.
- Top limit of the liner shall be a minimum of 1 inch up onto the casting. Bench shall receive a single coat of a minimum 1/2-inch thickness at the invert and shall increase in thickness in the direction of the wall so as to provide the required minimum slope. The entire bench shall be coated to the edge of the invert channel. The bench/wall intersection shall receive a radiused fillet.
5. Curing: The liner shall be cured a minimum of 4 hours before being exposed to flow.
 6. Acceptance Testing: Liner shall be visually inspected for complete coverage and finish. When directed by Engineer, water tightness of the liner shall be tested as follows:
 - a. When ground water is high or when cave-in adjacent to manhole allows dye to be introduced at the outer surface of the manhole, the liner shall be inspected visually for leaks. No leak shall be

discernible.

- b. When water is not present or cannot be introduced at the outer surface of the manhole, an exfiltration test shall be conducted. Manhole shall be inundated to top and allowed to stand for 5 minutes. For depths of 6 feet or less, water drop shall be less than 1 inch. For every additional foot of depth, an additional loss of 1/8-inch shall be acceptable.

SECTION 2510 CURED-IN-PLACE PIPE

2510.1 General

- A. This Section covers cured-in-place pipe for rehabilitation of existing sanitary and storm sewer mains and services. Topics include product and installer qualifications, prebid inspection, pipe preparation, lining design, cured-in-place pipe, building service restoration, point repair, and building service lining.
- B. Submittals: Contractor shall submit for review including, but not limited to, product data for the following:
 - 1. Liner tube, resin, sealant, and fittings, adapters, and specials.
 - 2. Certificates and Affidavits (furnish prior to shipment or installation as applicable):
 - a. Affidavit of compliance with applicable standards for resins and tube materials.
 - b. Certification that Contractor is a licensed installer of any patented process.
 - 3. Post Installation Video
- C. Delivery and Storage: Delivery and storage of lining and other materials shall conform to requirements of the manufacturer. Furnish required storage facilities. Handle lining materials in compliance with manufacturer's recommendations. Damaged material will be unacceptable for installation.
- D. Prequalifications: In order to be considered in the bid evaluation process, Contractor shall have: A minimum nation wide installation history of 250,000 feet of cured-in-place lining installations; a minimum nation wide installation history of 1,000 point repair lining installations; and a minimum nation wide installation history of 5,000 building service lining installations. All products shall have minimum 1 year installation history in MARC area counties. Applicant shall list references with contact names and phone numbers. Contractor shall provide Unified Government with prequalification information regarding cured-in-place projects at time of bid. This information shall include total linear feet of pipe installed, diameter of pipe, materials used, and contact name, address, and phone number of the owner to whom the service was provided. Unified Government may, at its discretion, adjust or waive the aforementioned prequalifications.
- E. Bidder's Inspection: Bidder shall examine video tapes of lines prior to prebid meeting. Bidder shall use tape to identify service connections, obstacles, and residual load carrying capacity of the host pipe. Bidder shall make a reach by reach (manhole to manhole) determination of load carrying capacity of the host pipe before the prebid meeting. Engineer will review differing opinions regarding host pipe capacity at the prebid meeting and make a determination of the required design assumptions by addendum. Obstacles located by Bidder shall be identified at the prebid meeting. Lines so deteriorated as to risk collapse with a complete and thorough cleaning shall be identified and discussed at the prebid meeting. Bidder shall evaluate obstacles and determine appropriate repair strategy. Successful Bidder shall submit copy of the prebid video tape along with a tape log and a proposal listing obstacle locations and repair strategy. Tape log shall include obstructions and all service or other connections to the pipe.
- F. Lining Design: Minimum liner thickness for each liner depth/diameter combination shall be as scheduled on the drawings. Engineer may consider Contractor proposed changes in thickness based upon use of higher flexural modulus resins. Contractor proposed changes must be supported by detailed calculations satisfactory to Engineer.
- G. Post Installation Video: Contractor shall provide one copy of a videotape showing pipe after lining. Video shall be annotated to indicate all restored services.

2510.2 Materials

- A. Materials shall conform to ASTM D5813, "Cured-In-Place Thermosetting Resin Sewer Pipe".
- B. Liner Tube: The tube shall consist of one or more layers of flexible needled felt or an equivalent nonwoven material capable of carrying resin and withstanding installation pressures and curing temperatures. The liner tube shall be manufactured of a resin-impregnated flexible tube cured in place using circulating hot water. The tube shall be compatible with the resin system used. The tube shall be capable of conforming to offset joints, bells, and disfigured pipe sections. The tube shall be custom fabricated to a size that, when installed, will tightly fit the internal circumference of the original conduit. Allowance shall be made for circumferential stretching during installation. Contractor shall determine the tube lengths for individual installation runs in accordance with manufacturer's recommendations.
- The cured liner tube shall conform to the following minimum structural standards:
1. Tensile strength- 3,000 psi.
 2. Flexural stress- 4,500 psi.
 3. Flexural modulus of elasticity- 250,000 psi.
- C. Resin: The resin used shall have the following characteristics:
1. The resin used shall be high-grade corrosion resistant isophthalic polyester, vinyl ester, or epoxy that is compatible with the liner tube and installation process to be used.
 2. The resin must be able to cure in the presence of water, and the initiation temperature for cure shall be less than 180° F.
- D. Sealant: A sealant composed of a resin mixture compatible with the liner tube and as recommended by the liner tube manufacturer shall be used at pipe terminations and at points where the cured lining tube fails to make a tight seal.
- E. Installation Equipment: Provide equipment for the installation and curing of the liner tube as recommended by the manufacturer.

2510.3 Construction

- A. Installation shall be in accordance with ASTM F1216, "Rehabilitation of Existing Pipelines and Conduits by the Inversion and Curing of a Resin-Impregnated Tube" or ASTM F1743, "Standard Practice for Rehabilitation of Existing Pipelines and Conduits by Pulled-in-Place Installation of Cured-in-Place Thermosetting Resin Pipe (CIPP)." Products shall conform to ASTM D5813, "Cured-In-Place Thermosetting Resin Sewer Pipe".
- B. Precleaning: Contractor shall remove all internal debris, solids, and roots from the sewer line that will interfere with the installation or adhesion of the lining. Only fully deteriorated lines identified at the prebid meeting as subject to collapse by cleaning operations shall be exempt from a complete cleaning. Contractor shall make a post cleaning/pre-installation video to verify line is clean and obstructions are clear.
- C. Spot Repairs: Line obstructions shall be repaired as follows:
1. The original pipeline shall be clear of obstructions such as solids, dropped joints, protruding service connections, crushed or collapsed pipe, and reductions in the cross sectional area of more than 20 percent that will prevent the insertion of the resin impregnated tube. Protruding service connections shall be removed to prevent dimpling of the finished liner. Maximum allowable protrusion shall be 1/2-inch. If inspection reveals an obstruction that cannot be removed by conventional sewer cleaning equipment, a spot repair excavation shall be made to uncover and remove or repair the obstruction.

2. Contractor shall perform all cured-in-place sectional and spot repairs for the sewer line segments scheduled.
 3. Building service lining shall be provided where called out on plans or special conditions.
- D. Bypass Pumping: See related work in this section.
- E. Placement and Curing:
1. Installation by inversion is required to be in compliance with ASTM F1216 as follows:
 - a. Prepare inversion tube by vacuum impregnating the liner tube with the uncured resin. Install inversion standpipe over existing manhole or other Unified Government-approved access. Attach and insert inversion tube through the standpipe with watertight seal and lubricated as recommended by the manufacturer. Invert liner to predetermined length through the existing pipe using hydrostatic pressure in the standpipe and in accordance with manufacturer's approved procedure.
 - b. Maintain water at constant temperature during hydraulic leak test that shall be performed during the curing period. Provide certification of test results for each installed section.
 - c. Cure installed liner using a hot water recirculation system designed to develop uniform curing temperature throughout the entire length of the lined section. The manufacturer shall approve the procedure and temperature for the resin/catalyst system employed. The resin manufacturer shall recommend duration of the cure period, and liner shall obtain proper hardness before curing is considered complete.
 - d. Cool the hardened liner by introducing cool water into the recirculation system and draining the heated water. Maintain static head on cured liner until temperature throughout the liner is reduced below 100° F. Limit drainage rate to avoid creating a vacuum and damaging the freshly cured liner.
 - e. Seal any annular space between the cured liner tube and the existing pipe where the cured tube fails to make a tight seal. Seals shall be a resin mixture compatible with the resins in the inversion tube.
- F. Building Service Reinstatement: Prior to installation, Contractor shall record the location of service connections and lateral lines. Service reinstatements shall be made by trenchless technologies that provide continuous lining from the main through the connection and a minimum 3 feet into the service. If, after review by Engineer, it is determined a service cannot be reinstated with trenchless technology, it shall be reinstated with conventional open cut methods. Services shall be reinstated within the time limits listed in these specification, regardless of method.
- G. Strength Tests: Short-term flexural properties and tensile properties tests specified in ASTM F1216 shall be performed and the results submitted to Engineer.
- H. Tightness Tests: Tightness tests can be conducted by any means allowed for sanitary sewer mains. As a substitute to the tightness test, hydrostatic test conducted during curing will be allowed when equipment is set up to provide accurate measurement of makeup water. Results shall be submitted to Engineer.

END OF SECTION

TECHNICAL PROVISIONS

Section 2600

Storm Sewer



Unified Government of Wyandotte County

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SECTION 2601 GENERAL

2601.1 Scope

This section governs the furnishing all labor, materials, and equipment necessary for the complete installation of storm sewers and appurtenances as shown on the Plans and in accordance with the Standard Drawings, the specifications and the Special Provisions. Unless otherwise noted within these specifications, the word "sewers" shall refer to pipe sewers, box culvert sewers, or open channels.

2601.2 Referenced Standards

The following standards are referenced directly in this section. The latest version of these standards shall be used. If conflicting standards exist, the more stringent standard shall apply.

UG

Section 2100	Clearing, Grading, Excavation and Site Preparation
Section 2150	Erosion and Sediment Control
Section 2200	Paving
Section 2300	Incidental Construction
Section 2400	Seeding and Sodding

ASTM

A 48	Standard Specification for Gray Iron Castings
A 139	Standard Specification for Electric-Fusion (Arc)-Welded Steel Pipe (NPS 4 and Over)
A 153	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
A 240	Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications
A 615	Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
A 641	Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
A 742	Standard Specification for Steel Sheet, Metallic Coated and Polymer Precoated for Corrugated Steel Pipe
A 744	Standard Specification for Castings, Iron-Chromium-Nickel, Corrosion Resistant, for Severe Service
A 745	Standard Practice for Ultrasonic Examination of Austenitic Steel Forgings
A 760	Standard Specification for Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains
A 761	Standard Specification for Corrugated Steel Structural Plate, Zinc-Coated, for Field-Bolted Pipe, Pipe-Arches, and Arches
A 788	Standard Specification for Steel Forgings, General Requirements
A 929	Standard Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe
A 1064	Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
C 33	Standard Specification for Concrete Aggregates
C 76	Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
C 88	Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
C 361	Standard Specification for Reinforced Concrete Low-Head Pressure Pipe
C 443	Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
C 478	Standard Specification for Circular Precast Reinforced Concrete Manhole Sections
C 506	Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe
C 507	Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe
C 923	Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals
C 990	Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
C 1628	Standard Specification for Joints for Concrete Gravity Flow Sewer Pipe, Using Rubber Gaskets

- D 1683 Standard Test Method for Failure in Sewn Seams of Woven Apparel Fabrics
- D 2321 Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
- D 3350 Standard Specification for Polyethylene Plastics Pipe and Fittings Materials
- D 3887 Standard Specification for Tolerances for Knitted Fabrics
- D 5034 Standard Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)
- F 593 Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs
- F 594 Standard Specification for Stainless Steel Nuts
- F 2306 Standard Specification for 12 to 60 in. [300 to 1500 mm] Annular Corrugated Profile-Wall Polyethylene (PE) Pipe and Fittings for Gravity-Flow Storm Sewer and Subsurface Drainage Applications
- G 152 Standard Practice for Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials

AASHTO

- M 31 Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
- M 36 Standard Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drain
- M 55 Standard Method of Test for Steel Welded Wire Reinforcement, Plain, for Concrete
- M 196 Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains
- M 197 Standard Specification for Aluminum Alloy Sheet for Corrugated Aluminum Pipe
- M 245 Standard Specification for Corrugated Steel Pipe, Polymer-Precoated, for Sewers and Drains
- M 246 Standard Specification for Steel Sheet, Metallic-Coated and Polymer-Precoated, for Corrugated Steel Pipe
- M 274 Standard Specification for Steel Sheet, Aluminum-Coated (Type 2), for Corrugated Steel Pipe
- M 294 Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter

ANSI/AWWA

- C 206 Field Welding of Steel Water Pipe

ACI 301 Specifications for Structural Concrete

Federal Standard 595B

KCMMB Kansas City Metro Materials Board

Specifications Kansas Department of

Transportation

Standard Specifications for State Road and Bridge Construction, 2015 Edition

2601.3 Cleanup

Cleanup shall follow the work progressively. The Contractor shall remove from the project site all rubbish, equipment, tools, surplus or discarded materials, and temporary construction items.

Streets to be opened to local traffic at the end of the day's operation shall be cleaned of dirt or mud. All equipment and material stockpiles shall be secured for safe passage of vehicles and pedestrians. If streets are to remain open to traffic, cleaning shall be performed at a minimum of once per day at the end of the day's work or as directed by the Engineer or Owner.

Clean-up shall be considered subsidiary to other items in the Contract Documents.

SECTION 2602 PIPE SEWER CONSTRUCTION

2602.1 Scope

This section governs the furnishing of all labor, materials and equipment for the construction of pipe storm sewers and appurtenances at the location and to the lines and grades indicated on the Plans.

2602.2 Materials

A. Reinforced Concrete Pipe

1. Pipe: Reinforced concrete pipe shall conform to the following ASTM Standards and be of the minimum strength designated herein or such higher strength as may be required by the Plans:
 - a. Round Pipe: ASTM C 76, Class III (minimum), Wall B (minimum)
 - b. Arch Culvert Pipe: ASTM C 506, Class A-III
 - c. Elliptical Pipe: ASTM C 507, Class HE-III

Except for fittings and closure pieces, each joint of pipe shall not be less than eight feet long for pipe diameters 48 inches or less and shall not be less than six feet long for pipe diameters larger than 48 inches.

2. Reinforcement: Circumferential reinforcement shall be full-circle type. Part-circle reinforcement will not be approved. All reinforcing shall be located and spaced as recommended by the pipe manufacturer.

3. Joints

- a. Rubber Gasket Joints: Rubber gasket joints shall conform to ASTM C 443 or ASTM C 1628-06 with the following additions and exceptions.
 - i. Replace ASTM C 1628-06 5.1.1 with: Circular Cross-Section or "O-Ring" Gaskets for standard use shall meet Class A requirements. Non-Circular Cross-Section or "Profile" Gaskets for standard use shall meet Class E requirements.
 - ii. Replace ASTM C 1628-06 9.4 with: The manufacturer shall conduct concurrently the hydrostatic test described in 9.2 and the structural test described in 9.3. If proven watertight under these combined conditions, hairline cracks that do not leak shall not be cause for rejection. A vacuum of the American Concrete Pipe Association, may be used in lieu of the hydrostatic test referenced above.
 - iii. Joint design details shall be submitted for approval together with design data and test results verifying the adequacy of the joint design.
- b. Preformed Flexible Joint Sealant: This sealant shall be either rope form or flattape form conforming to ASTM C 990. Primer, if recommended by the manufacturer, shall be applied within the manufacturers' time requirements on all bell and spigot joint surfaces. Joint shall be thoroughly sealed and watertight.

- #### B. Structural Plate Pipe and Pipe Arches: Structural plate and galvanizing shall conform to the requirements of ASTM A 761. Bolts, nuts, and washers for reconnecting plates shall be galvanized in accordance with ASTM A 153 and meet manufacturer's recommendations.

C. High Density Polyethylene (HDPE) Pipe

1. Material: Pipe manufactured for this specification shall comply with and be certified to meet the requirements for test methods, dimensions and markings found in ASTM F 2306 and AASHTO M-294,

current additions. Pipe and blow molded fittings shall be made from PE compounds which conform to the requirements of cell class 435400C in the latest version of ASTM D3350.

2. Pipe Sizes: Nominal sizes for this specification include 12-60 inch diameters designated in AASHTO M294 and ASTM F 2306 as full circular cross section with an outer corrugated pipe wall and essentially smooth inner wall (waterway). Pipe corrugations shall be annular.
3. Joints: Joints shall have a gasket and may be either bell and spigot joints or made with external coupling bands. The fittings and couplings bands shall be fabricated from the same material as the pipe conforming to AASHTO M294. The coupling bands shall cover at least two full corrugations of each section of pipe and shall prevent infiltration of soil into the pipe. Gaskets shall be furnished in accordance with the Plans and Special Provisions. Coupling bands shall be reviewed and approved by the Engineer prior to installation.
4. Certification: All high-density polyethylene (HDPE) pipe used for culvert and storm sewer applications shall conform to the requirements of AASHTO M294 and ASTM F 2306, current edition. Pipe shall be provided only by manufacturers that are certified through the National Transportation Product Evaluation Program (NTPEP) Third Party Certification program.
5. Pipe Usage: High density polyethylene pipe (HDPE) may not be used for crossroad applications of collector roadways or higher unless approved by the Engineer. If approved by the engineer, HDPE in accordance with ASTM F2648, latest version, may be used in lieu of ASTM F2306 and AASHTO M294 in drainage applications that are designated as private.

D. Dual Walled Polypropylene Pipe

1. For 12-inch to 60-inch pipe, polypropylene pipe shall have a double wall with a smooth interior and annular exterior corrugations and conform to ASTM F2881 and AASHTO M330. The pipe shall not be perforated unless otherwise specified.
2. For 12-inch to 60-inch pipe, pipe shall be joined with a gasketed integral bell and spigot joint meeting the requirements of ASTM F2881.
3. Coupling bands shall cover at least two full corrugations on each section of pipe and shall prevent the infiltration of soil into the pipe.
4. Certification: All polypropylene (PP) pipe used for culvert and storm sewer applications shall be provided only by manufacturers that are certified through the National Transportation Product Evaluation Program (NTPEP) Third Party Certification program.

E. Dual and Triple Walled Polypropylene Pipe

1. For 12-inch to 30-inch pipe, polypropylene pipe shall have a double wall with a smooth interior and annular exterior corrugations and conform to ASTM F2881 and AASHTO M330 Type S. For 36-inch and larger pipe sizes, polypropylene pipe shall have a triple wall with smooth interior and exterior surfaces with inner corrugations and conform to ASTM F 2764 and AASHTO M330 Type D. The pipe shall not be perforated unless otherwise specified.
2. For 12-inch to 30-inch pipe, pipe shall be joined with a gasketed integral bell and spigot joint meeting the requirements of ASTM F2881. For 36-inch and larger pipe, pipe shall be joined with a gasketed integral bell and spigot joint meeting the requirements of ASTM F2764.

3. Coupling bands shall cover at least two full corrugations on each section of pipe and shall prevent the infiltration of soil into the pipe.
 4. Certification: All polypropylene (PP) pipe used for culvert and storm sewer applications shall be provided only by manufacturers that are certified through the National Transportation Product Evaluation Program (NTPEP) Third Party Certification program.
- F. Granular Bedding Material: Refer to Section 2100 Clearing, Grading, Excavation and Site Preparation.
- G. Flowable Backfill (CLSM): Refer to Section 2100 Clearing, Grading, Excavation and Site Preparation.

2602.3 Construction

- A. Trench Excavation: Refer to Section 2100 Clearing, Grading, Excavation and Site Preparation.
1. Unclassified Excavation: Refer to Section 2100 Clearing, Grading, Excavation and Site Preparation.
 2. Rock Excavation: Refer to Section 2100 Clearing, Grading, Excavation and Site Preparation.
 3. Earth Excavation: Refer to Section 2100 Clearing, Grading, Excavation and Site Preparation.
 4. De-watering: Refer to Section 2100 Clearing, Grading, Excavation and Site Preparation.
 5. Cribbing and Sheet piling: Refer to Section 2100 Clearing, Grading, Excavation and Site Preparation.
 6. Unstable Foundation: Refer to Section 2100 Clearing, Grading, Excavation and Site Preparation.
 7. Protection of Property: The Contractor shall satisfactorily shore, support, and protect any and all structures and all pipes, sewers, drains, conduits, and other facilities, and shall be responsible for any damage resulting thereto. The Contractor shall not be entitled to any damages or extra pay on account of any postponement, interference, or delay caused by any such structures and facilities being on the line of work, whether or not they are shown on the Plans; specifically, but not limited to, damage due to delay in utility relocation.
- B. Laying and Jointing
1. Handling and Protection: All pipe shall be protected during installation against shock and free fall, and be installed without cracking, chipping, breaking, bending, or damage to coating materials. Damaged pipe materials shall be replaced with new materials.
 2. Grade Control: Maximum deviation from indicated alignment of any pipe after installation and backfilling shall not be greater than 0.1 foot. All pipe shall have a continuous slope free from depressions that will not drain. The Contractor shall establish such grade control devices as are necessary to maintain the above tolerances.
 3. Laying: The laying of pipe in finished trenches shall commence at the lowest point, and pipe shall be installed with the bell end forward or upgrade. All pipe shall be laid with ends abutting and true to line and grade. Pipe laid shall be carefully centered to form a sewer with a uniform invert.
 4. Bedding: Bedding shall be rodded, spaded, and consolidated as necessary to provide firm uniform support for the pipe, and not subject pipe to settlement or displacement.

5. Jointing: Preparatory to making filled, bonded, and watertight sealed pipe joints, all surfaces of the portions of the pipe to be jointed shall be clean and dry. Lubricants, primers, adhesives, and other substances that are used shall be compatible with the jointing material recommended or specified.

Other than for trimming sewer pipe to be flush with the inside walls of storm sewer structures, no pipes may be trimmed unless ordered by the Engineer.

Trenches shall be kept water-free and as dry as possible during bedding, laying, and jointing, and for as long a period as required to protect the pipe joints and concrete in structures.

As soon as possible after the joint is made, sufficient bedding material shall be placed alongside each side of the pipe to offset conditions that might tend to move the pipe off line and grade.

a. Concrete Pipe

- i. Plastic Joint Sealant: Plastic joint sealant shall be applied to the tongue and spigot prior to its insertion into the bell or groove. A sufficient amount of sealant shall be used to fill the annular joint space with some excess. Wipe the outside surface of the joint with additional material to assure a complete seal.
- ii. Flexible Gaskets: Flat gaskets may be cemented to the pipe tongue or spigot. O-ring gaskets shall be recessed in a groove on the pipe tongue or spigot and confined by the bell or groove after the joint is completed. Roll-on gaskets shall be placed around the tongue or spigot and rolled into position as the joint is assembled. Flat gaskets and O-ring gaskets shall be lubricated as recommended by the manufacturer.
 - a) Flat gasket: Flat flexible gaskets shall conform to ASTM C 443. If there is no recess provided for the gasket, the surface of the tongue shall be cleaned and rubber adhesive applied. Using quick-drying adhesive, gaskets may be applied ahead of the laying operation or in the plant.
 - b) O-ring gasket: O-ring or roll-on flexible gaskets shall conform to ASTM C 361, Section 4.10. The entire surface of the bell that comes in contact with the rubber gasket shall be well lubricated with a soap lubricant. The entire gasket shall be greased with soap. Only the soap lubricant supplied by the pipe manufacturer shall be used. Adhesive type cements shall not be used.

- b. Corrugated Metal Pipe. Corrugated metal pipe joints shall have a gasket and may be either bell and spigot joints or made with external coupling bands. The bands shall be drawn and secured on the pipe by connecting devices as furnished by the manufacturer. Pipe ends for annular corrugation shall be identical to the rest of the pipe barrel (plain ends), or in the case of helical pipe, the pipe ends at the joint shall be reformed to an annular corrugation and flange (reformed end). Gaskets shall be furnished in accordance with the Plans and Special Provisions. Coupling bands shall be reviewed and approved by the Engineer prior to installation.

- c. HDPE Pipe: HDPE pipe shall be assembled, installed, and backfilled in accordance with the manufacturer's instructions. Joints shall have a gasket and may be either bell and spigot joints or made with external coupling bands. The fittings and couplings bands shall be fabricated from the same material as the pipe conforming to AASHTO M294. The coupling bands shall cover at least two full corrugations of each section of pipe and shall prevent infiltration of soil into the pipe. Gaskets shall be furnished in accordance with the Plans and Special Provisions. Coupling bands shall be reviewed and approved by the Engineer prior to installation.

During construction of the project in areas subjected to heavy construction equipment traffic, pipe sizes 12" - 42" shall have a minimum cover of 3 feet, and pipe sizes 48" - 120" shall have a minimum cover of 4 feet.

- d. Structure Connections: Pipes connected to structures shall be cut parallel with the inside face of the structure for structures having plane walls and parallel with the spring line of the pipe for structures having curved walls. Projection of the pipe beyond the inside face shall not exceed 1 inch (measured at the springline for structures having curved walls).

C. Backfill of Trenches

- 1. General: Refer to Section 2100 Clearing, Grading, Excavation and Site Preparation.

SECTION 2603 BORING AND JACKING

2603.1 Scope

This section governs the furnishing of all labor, materials and equipment for the construction of steel casings, complete with bulkheads and sand fill, by boring and/or jacking at the locations and to the lines and grades indicated on the Plans, or where constructed at the Contractor's option, when approved, to bypass obstructions without open cutting.

2603.2 Materials

A. Steel Casing

1. Steel casing for bored or jacked construction shall conform to ASTM A 139.
2. Steel shall be grade B under railroads and grade A for all other uses.
3. Minimum wall thickness for steel casing shall be in accordance with the following table:

<u>Diameter of Casing</u>	<u>Under Railroads</u>	<u>All Other Uses</u>
24"	0.406"	0.281"
26"	0.438"	0.281"
28"	0.469"	0.312"
32"	0.500"	0.312"
34"	0.500"	0.312"
36"	0.500"	0.344"

4. Casing joints shall be welded by a certified welder in accordance with ANSI/AWWA C206.

B. End Seals: End seals shall be manufactured end seals, concrete plugs with allowances for water flow, or brick shall be in accordance with ASTM C 32, Grade SS or SM and mortar in accordance with ASTM C270.

C. Sand Fill: Sand fill shall comply with ASTM C 33, Fine Aggregate. Moisture content of the sand shall not exceed 0.5%.

2603.3 Construction Details

A. Boring and Jacking

1. Prior to starting work, complete details of the methods and the liner material to be used shall be submitted to the Engineer for approval.
2. The maximum allowable deviation from indicated alignment and grade shall be as follows except when altered by the Plans or Special Provisions:
 - a. Alignment 1.0%
 - b. Grade 1.0%

B. Casing Installation

1. The steel casing shall be advanced in a continuous operation without interruption. Sections of the casing pipe shall be welded together to form a continuous conduit capable of resisting all stresses including jacking stresses. The casing in its final position shall be within alignment and grade

tolerances specified in Section 2603.3.A.2. There shall be no space between the earth and the outside of the casing. Any voids which do occur shall be filled by pressure grouting.

2. Boring operations shall be performed by experienced crews using a rotary type boring machine designed especially for this purpose. Boring shall be performed in a manner to prevent disturbing the overlying and adjacent materials.
3. Jacking
 - a. Jacking frame, guides, blocking, head, and reaction devices shall be arranged to apply uniform pressure about the casing circumference without damage to the casing material, and to maintain alignment within specified tolerances.
 - b. Jacking reaction device shall provide adequate resistance to withstand 200 percent of the maximum jacking pressure.
 - c. Provide jacks of adequate number and size for the required jacking pressure; but not less than two jacks.
 - d. Maintain jacking pit and pipe installation in such condition that drainage does not accumulate. Control and disposition of surface and subsurface water at the site of jacking operations shall be the Contractor's responsibility.
 - e. Excavation at the heading shall not be extended more than 1 inch outside the top and sides (upper 300-degree sector) of the casing and shall be true to grade at the invert (lower 60-degree sector).
 - f. Once jacking begins, it shall proceed without interruption until installation of the entire length of the jacked casing is complete.
4. Excavation in Jacked Casings: Perform excavation within jacked casings by hand or machine methods as necessary to remove the materials encountered without disturbing the overlying material. The jacked casing shall be advanced a sufficient distance ahead of the excavation face and/or shield used as necessary to protect the workman and the work, and to prevent the uncontrolled entry of unstable materials into the casing.
5. Unstable Materials: If materials are encountered during casing installation that cannot be excavated safely or without creating voids around the exterior of the casing, the Contractor shall discontinue casing installation and stabilize such materials by dewatering, chemical soil stabilization, grouting, or other methods, and/or modify equipment and procedures as necessary to complete the casing installation.

C. Sewer Pipe Installation

1. Pipe shall be placed inside the casing to the indicated line and grade by the use of wood skids or other equivalent methods. The wood shall be pressure-treated with a preservative in accordance with ASTM D 1760. Cut surfaces shall be given 2 heavy brush coats of the same preservative. The wood skids shall be securely fastened to the sewer pipe with steel straps.
2. End seals shall be constructed after the sewer pipe is installed and approved.
3. The annular space between the casing and sewer pipe shall be filled with sand blown in so that all space is filled without disturbing the alignment and grade of the sewer pipe. Flowable Backfill (CLSM) meeting Section 2102.2.E, may be substituted in lieu of sand fill. Alternative methods may be submitted for approval by the Engineer.

SECTION 2604 STRUCTURES

2604.1 Scope

This section governs the furnishing of all labor, materials and equipment for the performance of all work necessary for construction of cast-in-place and precast concrete structures for inlets, manholes, junction boxes, box culverts, headwalls, and incidental structures.

Masonry or brick structures shall not be allowed under these Specifications.

2604.2 Materials

A. Concrete Mixes: Concrete shall be KCM MB 4K, unless otherwise specified.

B. Concrete Materials

1. For KCM MB mixes, concrete shall be an approved mix with admixtures that are approved for use in that mix design.
2. Water: Water shall be clean and free from deleterious substances. Only potable water will be acceptable without testing.

C. Reinforcing Steel: Reinforcing bars shall conform to ASTM A 615 or AASHTO M 31, Grade 60. Welded steel wire fabric shall conform to ASTM A 1064 or AASHTO M 55.

D. Precast Concrete Structures

1. Manholes: Precast manholes shall conform to ASTM C 478.
2. End Sections for Concrete Pipe: Shall be flared end sections of the pipe manufacturer's standard design and shall meet all applicable requirements of ASTM C 76 for Class II or higher classes of pipe.
3. Rectangular Structures: Shall conform to the inside dimension indicated on the Plans and be designed for the following loads:
 - a. HS-20 live load for all structures in/or under pavement, shoulders, driveways, and other traffic areas.
 - b. 2,000-lb wheel live load for curb opening inlets and junction boxes in non-traffic areas.
 - c. 50 pcf equivalent fluid pressure for soil pressure on vertical walls.
 - d. 120 pcf for unit weight of soil cover on top slabs.
4. Joints: Joints between concrete structures shall be filled with plastic joint compound or preformed plastic compound as stated herein.
 - a. Barrel Sections: Minimum cross-sectional area of preformed compound between concrete barrel sections shall be 1-inch square or 1.25 inches diameter. Minimum cross-sectional area of the preformed compound between the concrete adjustment ring and cone barrel section shall be two beads of either 1-inch square or 1.25 inches in diameter.
 - b. Manhole Adjustment Rings: Rings shall be constructed of concrete, HDPE, or recycled rubber.

If HDPE adjustment rings are used, they shall be injection molded-recycled HDPE - as manufactured by LADTECH, Inc. or approved equal. They shall be bolted to the structure top

section and otherwise installed as per manufacture's recommendations.

If recycled rubber adjustment rings are used, they shall consist of no less than 80%, by weight, recycled rubber and no less than 10% by volume shredded fiber as manufactured by GNR Technologies or approved equal. They shall be installed as per manufacturer's recommendations.

The top and bottom of all adjustment rings shall be sealed using a mastic filler meeting the requirements of 2503.D.6 or an epoxy paste. The epoxy paste shall be a two component, moisture insensitive, containing no solvents, and capable of bonding with all materials it is to be used on, like Epoxytex Micor C.P.P or approved equal. Minimum cross-sectional area of preformed compound between concrete adjustment rings shall be two beads of either 1-inch square or 1.25 inches in diameter.

- c. Manhole Ring and Covers: Minimum cross-sectional area of preformed compound between the concrete adjustment ring and the manhole casting shall be two beads of either 1-inch square or 1.25 inches in diameter.
- d. External Manhole Chimney Frame Seal: External frame seal shall consist of a flexible rubber sleeve, interlocking adjustment extension(s), and stainless-steel compression bands. The flexible rubber sleeve and extension shall be extruded or molded from a high-grade rubber compound conforming to the applicable requirements of ASTM C 923 with a minimum tensile strength of 1500 psi and minimum elongation at break of 350%. At a minimum, the compression bands shall be 16-gauge stainless steel conforming to ASTM A 240, Type 304, with a minimum width of one inch. Screws, nuts, and bolts shall be stainless steel conforming to ASTM F 593 and 594, Type 304. The compression bands shall have the capacity to tighten with enough pressure to make a watertight seal around the rubber chimney sleeve.

E. Air Entrainment: All concrete shall be air entrained. Minimum strength requirements shall be as specified in Section 2604.2.A. Concrete Mixes.

F. Manhole Castings

- 1. Rings and Covers: Castings shall be gray iron conforming to ASTM A 48, Class 35B. Castings of rings and covers shall be of the shape, dimension, minimum weight, and type as indicated on Plans or Standard Drawings and be free from manufacturing defects. All curb inlet castings shall have cam locks or approved equal. If requested by special order, castings shall be cleaned and painted with one coat of tar prior to delivery. Bearing surfaces between all rings and covers for installation in all areas shall be machined to provide even seating and interchangeability of like pieces.

All manhole rings and covers placed in paved areas shall be rated for H20 traffic. Cam lock covers or similar shall not be placed in roadway pavement unless shown on the Plans or directed by the Engineer. All covers shall have provisions for opening, such as concealed pick holes.

- 2. Steps: All steps shall comply with Section 2509.3.G.2.b. Cast iron steps shall not be used.

G. Toe Walls: Flared end sections for concrete and steel pipe shall be set on a concrete toe wall centered on the end of the section. Toe walls shall be 8 inches thick by 24 inches deep by the width of the end section.

2604.3 Construction

A. Concrete Structures: Concrete construction shall conform to the current ACI 301 Specifications for Structural Concrete.

1. Precast Structures: The Contractor may, at his option, construct precast concrete inlets, junction boxes, and box culverts, in lieu of the cast-in-place structures indicated on the Plans; except that all concrete base slabs for pre-cast inlets, manholes, and junction boxes may be cast-in-place. Solid concrete brick or block shall be used to block inlets and similar structures to grade during placement of base slab concrete.

Precast concrete box culvert sections shall be installed on a 4-inch leveling course of untreated compacted aggregate conforming to Section 2200 Paving. Leveling courses shall extend 1 foot past the line of the box section and be finished to a true plane surface to provide uniform bearing for the precast section.

Any adjustments required for precast structures to meet field conditions shall be at the cost of the Contractor.

2. Finishing: Exposed edges of all slabs, walls, and other concrete structures shall be beveled 3/4" or edged with a 1-1/4" radial tool.
 - a. Formed Surfaces: Immediately following removal of the forms, fins and irregular projections shall be removed. Form tie connections, holes, honeycomb spots, and other defects shall be chipped to ensure the voided area is exposed and shall be chipped back to solid material. These areas shall be thoroughly cleaned, saturated with water, and painted with a grout approved by the Engineer. The repaired surfaces shall be cured in accordance with these specifications.
 - b. Exposed Slabs: Finish for exposed slabs shall be wood float texture. Exposed edges shall be beveled or edged with a radial tool.
3. Form Removal: Forms shall remain in place until the concrete has attained sufficient strength to support loads imposed by backfilling, construction, and traffic. Within 24 hours of form removal, small holes and pockmarks of exposed walls shall be filled with Portland cement grout and rubbed smooth. Concrete voids and honeycombs shall be chipped open with a light hammer to expose weak areas for inspection. At the direction of the Engineer, expansive repair grout shall be used for partial reconstruction of otherwise sound structures.
 - a. Walls: Forms shall remain in place for a minimum of 5 days or until the concrete reaches a minimum strength of 2000 psi.
 - b. Slabs: Form shall remain in place for a minimum of 7 days or until the concrete reaches a minimum strength of 3000 psi.
4. Manhole Riser Adjustments: Manhole rings and covers shall be adjusted to match the slope and height, or grade, of pavements. In no case shall the surface pitch of the manhole ring and cover mismatch the pavement slope by more than 1/2 inch. The difference in height between the top of manhole cover and the top of precast cone shall not exceed 24 inches.

In lieu of replacing concrete adjustment rings that are properly seated and structurally sound but have a small fracture, an external rubber chimney may be fitted to secure a watertight seal between the casting (manhole ring and cover) and the concrete cone barrel section.

B. Invert Channels: Form concrete invert channels in manholes, inlets, and junction boxes to make changes in

direction of flow with smooth curves of as large a radius as permitted by the inside dimension of the structure.

Grade changes and transitions shall be smooth and uniform, and all parts of the invert channel and adjacent floor shall slope to drain. Channel bottom shall be finished smooth without roughness or irregularity. Invert channels for precast concrete structures may be cast integrally with the structure base slabs at the Contractor's option.

- C. Excavation and Backfill: Refer to Section 2100 "Clearing, Grubbing, Excavation and Site Preparation".

SECTION 2605 OPEN CHANNELS

2605.1 Scope

This section governs the furnishing of all labor, materials and equipment for the construction of open channel lining at the location, and to the lines, grades, and dimensions indicated on the Plans. Grading shall have been previously completed in accordance with Section 2100 Clearing, Grubbing, Excavation and Site Preparation.

2605.2 Materials

- A. Concrete Materials: Concrete shall be in accordance with 2604.2.B, unless otherwise specified. Reinforcing steel shall conform to ASTM A 615 or AASHTO M 31, Grade 60. Welded steel wire fabric shall conform to ASTM A 1064 or AASHTO M 55. Concrete Lined channels are discouraged and shall only be allowed with the approval of the County Engineer.
- B. Stone: Stone for riprap, and gabion linings shall consist of quarried rock and be sound, durable, and angular in shape. No more than 10 percent shall have an elongation greater than 3:1, and no stone shall have an elongation greater than 4: 1. Material shall be free from cracks, seams, or other defects. Shale and stone with shale seams are not acceptable.
1. The minimum unit weight of the stone shall be 155 pounds per cubic foot as computed by multiplying the specific gravity times 62.4 pounds per cubic foot.
 2. Not more than 10 percent of the stone shall exhibit splitting, crumbling, or spalling when subject to 5 cycles of the sodium sulfate soundness test in accordance with ASTM C 88.
 3. Riprap: Riprap layer shall have a minimum thickness of 15 inches, or 1.5 times as thick as the larger stones, whichever is greater.

The gradation for RipRap (Light Stone) shall be as follows:

Weight of Stone <u>In Lbs.</u>	Percent Passing <u>by Weight</u>
250	100 (minimum)
100	50 (maximum)
75	70 (maximum)
5	10 (maximum)

The gradation for RipRap (Heavy Stone) shall be as follows:

Weight of Stone <u>In Lbs.</u>	Percent Passing <u>by Weight</u>
1,000	100 (minimum)
500	50 (maximum)
75	10 (maximum)

The Contractor shall provide certification that the material meets the specified gradations.

4. Gabion Fill Stone: Stone shall be of the following gradations:

U.S. Standard Square <u>Mesh Sieve</u>	Percent Passing <u>by Weight</u>

10"	100
8"	85 - 100
6"	0 - 15
4"	0 - 10
3"	0

Stone shall be graded within the above limits as required to provide a unit weight in-place of 100 pounds per cubic foot or greater.

The Contractor shall provide certification that the material meets the specified gradations.

C. Filter Blanket: Filter blanket may be either of the following types at the Contractor's option:

1. Granular Filter: Granular filter material shall consist of sound, durable rock particles conforming to the following gradation:

<u>Sieve Size</u>	<u>Cumulative Percent Passing By Weight</u>
1"	100
1/2"	70 - 100
No. 4	50 - 85
No. 10	35 - 70
No. 40	20 - 50
No. 100	15 - 40

The Contractor shall provide certification that the material meets the specified gradations.

2. Filter Fabric: Filter fabric shall consist of woven or nonwoven fabric. The synthetic fiber of either the woven or nonwoven fabric shall consist of polypropylene, nylon, or polyester filaments. The percent open area shall be not less than 4 percent nor more than 10 percent. The cloth shall provide an Equivalent Opening Size (EOS) no finer than the U.S. Standard Sieve No. 100. In addition, filter fabric shall meet the following physical requirements:
 - a. Tensile Strength: Minimum grab tensile strength, both warpwise and fillingwise, shall be 200 pounds when tested in accordance with ASTM D 5034, using a 4-inch by 6-inch specimen and a jaw speed of 12 inches per minute.
 - b. Elongation: Grab elongation shall be not less than 15 percent nor more than 60 percent, both warpwise and fillingwise, when tested in accordance with ASTM D 5034.
 - c. Tear Strength: Minimum trapezoid tear strength shall be 100 pounds, both warpwise and fillingwise. Method of test for woven fabrics shall be in accordance with ASTM D 1117.
 - d. Bursting Strength: Minimum bursting strength shall be 400 psi when tested in accordance with ASTM D 3887.
 - e. Seam Strength: Woven fabric shall have a minimum seam-breaking strength of 180 pounds when tested in accordance with ASTM D 1683, using a jaw speed of 12 inches per minute.
 - f. Width: Filter fabric shall be furnished in widths of not less than 6 feet.

D. Gabion Baskets: Baskets shall be of the dimensions indicated on the drawings and be fabricated using hexagonal triple-twist wire mesh.

1. Wire: Wire shall be galvanized steel having a minimum tensile strength of 60,000 psi, and shall be zinc coated in accordance with ASTM A 641 Class 3.
2. Wire Mesh: Maximum dimension of the mesh opening shall be 4-1/2 inches or less, and the maximum

area of the mesh opening shall not exceed 12 square inches. Wire shall be 0.120-inch (minimum) diameter.

3. Seldedge Wire: Seldedge wire shall be 0.1535-inch (minimum) diameter. All perimeter edges of the mesh forming the gabion shall be securely seldedged so that joints formed by tying the seldedges have a strength equal to or greater than the body of the basket.
 4. Lacing and Stay Wire: Wire shall be 0.0866-inch diameter or larger. Other connection methods, such as stainless steel clips, may be substituted with approval of the Engineer.
 5. Diaphragms: Gabions shall be divided into cells not greater than 4 feet in width by wire mesh diaphragms. Diaphragms shall be factory secured to the base of the basket by continuous spiral wire.
 6. PVC (Polyvinyl Chloride) Coating: Where specified in the Plans, all wire used in the fabrication of the baskets and in the wiring operations during construction shall, after zinc coating, have an extruded coating of PVC. The coating shall be gray in color ranging between series 26187 and 26293 or between series 26373 and 26375, semi-gloss, as per Federal Standard 595B. The PVC coating shall be a nominal thickness of 0.02165 inches and shall nowhere be less than 0.015 inches in thickness. The coating shall be resistant to the destructive effects of immersion in acidic, salt or polluted water, exposure to ultraviolet light, and abrasion and shall retain these characteristics after a period of not less than 3,000 hours under test in accordance with ASTM G 23.
- E. Sod: Sod shall conform to the requirements of Section 2400 Seeding, Sodding and Overseeding.
- F. Seed: Seeding shall conform to the requirements of Section 2400 Seeding, Sodding and Overseeding.

2605.3 Construction

- A. Foundation Preparation: After completion of grading in accordance with Section 2100, the area to receive channel lining shall be trimmed and dressed to conform to the cross sections indicated on the Plans within a tolerance of plus or minus 1 inch from the theoretical slope lines and grades. All deleterious materials shall be removed from the foundation area.
- B. Concrete Lining
1. Concrete Lined channels are discouraged and shall only be allowed with the approval of the County Engineer.
 2. Preparation: Subgrade shall be moistened by sprinkling. Forms shall be securely staked, braced, and set to line and grade. Reinforcement and tie bars shall be held in position by bar chairs, concrete brick, or other approved devices.
 3. Placing and Finishing: Place, consolidate, and strike off concrete to the thickness indicated on the drawings. Concrete shall be tamped or vibrated to eliminate all voids and bring sufficient mortar to the top for finishing. Surface finish shall be a wood-float finish. Round all edges and joints with a 1/4 inch radius edging tool, except contraction joints may be sawed to a depth of 30 percent of the thickness of the concrete lining after concrete has hardened but before uncontrolled cracking occurs. Apply curing membrane as specified in Section 2200 "Paving".
- C. Filter Blanket
1. Granular Filter: Place granular filter to its full thickness in a single operation. Construction methods

shall be such that the material is placed without segregation. Compaction of granular filter material is not required.

2. Filter Fabric: Place filter fabric with its long dimension horizontal and lay free of tension, stress, folds, wrinkles, or creases.
 - a. Place to provide 18 inches minimum overlap at each joint and anchor to prevent dislocation during construction of overlaying material.
 - b. Fabric shall not be left exposed more than two weeks prior to placement of overlaying material. Tracked or wheeled equipment or vehicles shall not be operated on the fabric.
- D. Riprap Placement: Riprap shall be placed on the prepared foundation in a manner which will provide a reasonably well-graded mass of stone with the minimum practicable percentage of voids. The entire mass of stone shall be placed so as to be in conformance with the lines, grades, and thicknesses indicated. A filter blanket of filter fabric conforming to Section 2605.2.C.2 shall be constructed under all riprap. Riprap shall be placed to full-course thickness in one operation and in such a manner as to avoid displacing the fabric. The Contractor shall place the riprap in such a way as to not tear, puncture, or shift the fabric. Riprap shall not be dropped more than 3 feet when being placed directly on the fabric. Tears or rips in the fabric shall be repaired with fabric lapped a minimum of 12 inches in all directions.
 1. Placing: Placing of riprap in layers, or by dumping into chutes, or by similar methods likely to cause segregation will not be permitted.
 2. Distributing: The larger stones shall be well distributed and the entire mass of stone shall conform to the specified gradation. All material shall be so placed and distributed that there will be no objectionable accumulations of either the larger or smaller sizes of stone.
 3. Hand Placing: It is the intent of these specifications to produce a fairly compact riprap protection in which all sizes of material are placed in their proper proportions. Hand placing or rearranging of individual stones by mechanical equipment may be required to the extent necessary to secure the specified results.
- E. Gabion Baskets
 1. Assembly: Assemble each gabion unit by binding all vertical edges together with a continuous piece of connecting wire stitched around the vertical edge with coils spaced at 3 inches or less. Set empty units to line and grade and join units by stitching with connecting wire along adjoining edges. Install and securely fasten internal tie wires in each cell if necessary, to retain the shape of the cell during filling operations.
 2. Filling: Fill gabion cells with stone carefully by hand or machine to provide a minimum of voids and avoid bulges and distortions of the gabion. After filling, secure the lid to the sides, ends, and diaphragm by stitching with connecting wire.
 3. Filter Fabric/Gabion Unit Placement: A filter blanket of filter fabric conforming to Section 2605.2.C.2 shall be constructed under all Gabion Baskets. The Contractor shall place the gabions in such a way as to avoid tearing, puncturing, or shifting the fabric. Tears or rips in the fabric shall be repaired with fabric lapped a minimum of 12 inches in all directions.
- F. Sod: Sod shall be installed as specified in Section 2400 Seeding, Sodding and Overseeding, except all sod placed in drainage channels or ditches, including both the side slopes and bottom, shall be anchored in accordance with Section 2402.3.D.

SECTION 2606 CURED-IN-PLACE PIPE

This Section covers cured-in-place pipe for rehabilitation of existing sanitary and storm sewer mains and services. Topics include product and installer qualifications, prebid inspection, pipe preparation, lining design, cured-in-place pipe, building service restoration, point repair, and building service lining. Refer to Section 2510 Cured-In-Place Pipe.

END OF SECTION

SECTION 5607 ENGINEERED CHANNELS

5607.1 Introduction:

The criteria in this section apply to open channels that are not natural. Natural channels are covered in Section 5605. New buffers and filter strips are not required because engineered channels are strictly for conveyance.

5607.2 Easements:

Permanent easements shall be dedicated to the City/County for operation and maintenance of open channels.

- A. Engineered Channels:** Easements shall be as wide as the top of bank width; plus 10 feet on each side. Easements shall be continuous between street rights-of-way. When an improved channel begins or ends at a point other than the right-of-way of a dedicated street, a 15-foot or wider easement graded so as to permit access by truck shall be dedicated from the end of the channel to a street right-of-way. These are minimum requirements.

Easements shall be required for swales that collect stormwater runoff from more than **two** lots.

- B. Roadside Channels:** Roadside ditches are engineered channels that are located wholly or partly within the street right-of-way. Roadside ditches in the street right-of-way do not require an easement. Otherwise, roadside ditches shall have a dedicated easement from the street right-of-way extending to five feet outside of the top of the outside bank of the channel.

5607.3 Freeboard:

Freeboard shall not be required above the design headwater pool elevation at culvert entrance.

5607.4 Channel Linings:

- A.** Minimum lining height shall be the selected design storm water profile plus at least a 0.5-foot freeboard.
- B.** All channel linings, except turf, shall contain provision for relieving back pressures and water entrapment at regular intervals.
- C.** Lining height on the outside bend of curves shall be increased by:

$$y = \frac{D}{4} \quad \text{where:}$$

y = Increased vertical height of lining in feet
 D = Depth of design flow in feet

Increased lining height shall be transitioned from y to zero feet over a minimum of:

1. 30(y) feet downstream from the point of tangency (P.T.).
2. 10(y) feet upstream from the point of curvature (P.C.).

5607.5 Lining Material:

The types of lining material listed in Tables 5605-1 and 5606-1 shall be used to control damage and erosion. All riprap, grouted riprap, and gabion linings shall be designed with a filter fabric in conformance with Section 2605.2.C.2.

Other types of lining materials not specifically listed in Tables 5605-1 and 5606-1 may be used when approved by the City/County Engineer.

Concrete lined open channel bottoms are prohibited, unless a waiver to this criteria is granted by the City/County Engineer.

5607.6 Side Slopes:

A. Side slopes shall not be steeper than:

1. 3 horizontal to 1 vertical for turf lining.
2. 2.5 horizontal to 1 vertical for all other lining materials, unless a geotechnical analysis indicates a steeper slope can be used.
3. Flatter if necessary to stabilize slopes.

5607.7 Alignment Changes:

Alignment changes shall be achieved by curves having a minimum radius of:

$$R = \frac{V^2 \cdot W}{8D} \quad \text{where:}$$

R = Minimum radius on centerline in feet
 V = Design velocity of flow in feet per second
 W = Width of channel at water surface in feet
 D = Depth of flow in feet

5607.8 Vertical Wall Channels:

- A.** Vertical walls may be used for structural lining of improved channels when site conditions warrant; subject to the following special requirements:
1. Walls shall be designed and constructed to act as retaining walls.
 2. Adequate provisions shall be made for pedestrian entry/exit from the channel.

5607.9 Energy Management:

Use of grade control structures can be used to manage boundary shear.

Table 5605-1
CRITICAL SHEAR STRESSES FOR CHANNEL MATERIALS

	psf
<u>Granular Material</u>	
Boulders (100 cm)	20.295
Boulders (75 cm)	15.222
Boulders (50 cm)	10.148
Boulders (25.6 cm)	5.196
Rip Rap	3.132
Cobbles (6.4 cm)	1.299
Cobbles and shingles	1.100
Cobbles and shingles, clear water	0.910
Coarse sand (1mm)	0.015
Coarse sand (1mm)	0.015
Coarse gravel, noncolloidal (GW), clear water	0.300
Coarse gravel, noncolloidal, (GW)	0.670
Gravel (2cm)	0.406
Fine gravel	0.320
Fine gravel, clear water	0.075
Fine sand (0.125 mm)	0.002
Fine sand (0.125 mm) (SP)	0.002
Fine sand (SW), (SP), colloidal	0.075
Fine sand, colloidal, (SW), (SP), clear water	0.027
Graded loam to cobbles, noncolloidal (GM)	0.660
Graded loam to cobbles, noncolloidal,(GM), clear water	0.380
Graded silts to cobbles, colloidal (GC)	0.800
Graded silts to cobbles, colloidal, (GC), clear water	0.430
<u>Fine Grained</u>	
Resistant cohesive (CL), (CH)	1.044
Stiff clay, very colloidal, (CL)	0.460
Stiff clay, very colloidal, (CL), clear water	0.260
Moderate cohesive (ML-CL)	0.104
Ordinary firm loam (CL-ML)	0.150
Ordinary firm loam, (CL-ML), clear water	0.075
Alluvial silts, colloidal (CL-ML)	0.460
Alluvial silts, colloidal,(CL-ML), clear water	0.260
Alluvial silts, noncolloidal (ML)	0.150
Alluvial silts, noncolloidal, (ML), clear water	0.048
Sandy loam, noncolloidal (ML)	0.075
Sandy loam, noncolloidal, (ML), clear water	0.037
Silt loam, noncolloidal (ML)	0.110
Silt loam, noncolloidal, (ML), clear water	0.048
Shales and hardpans	0.67

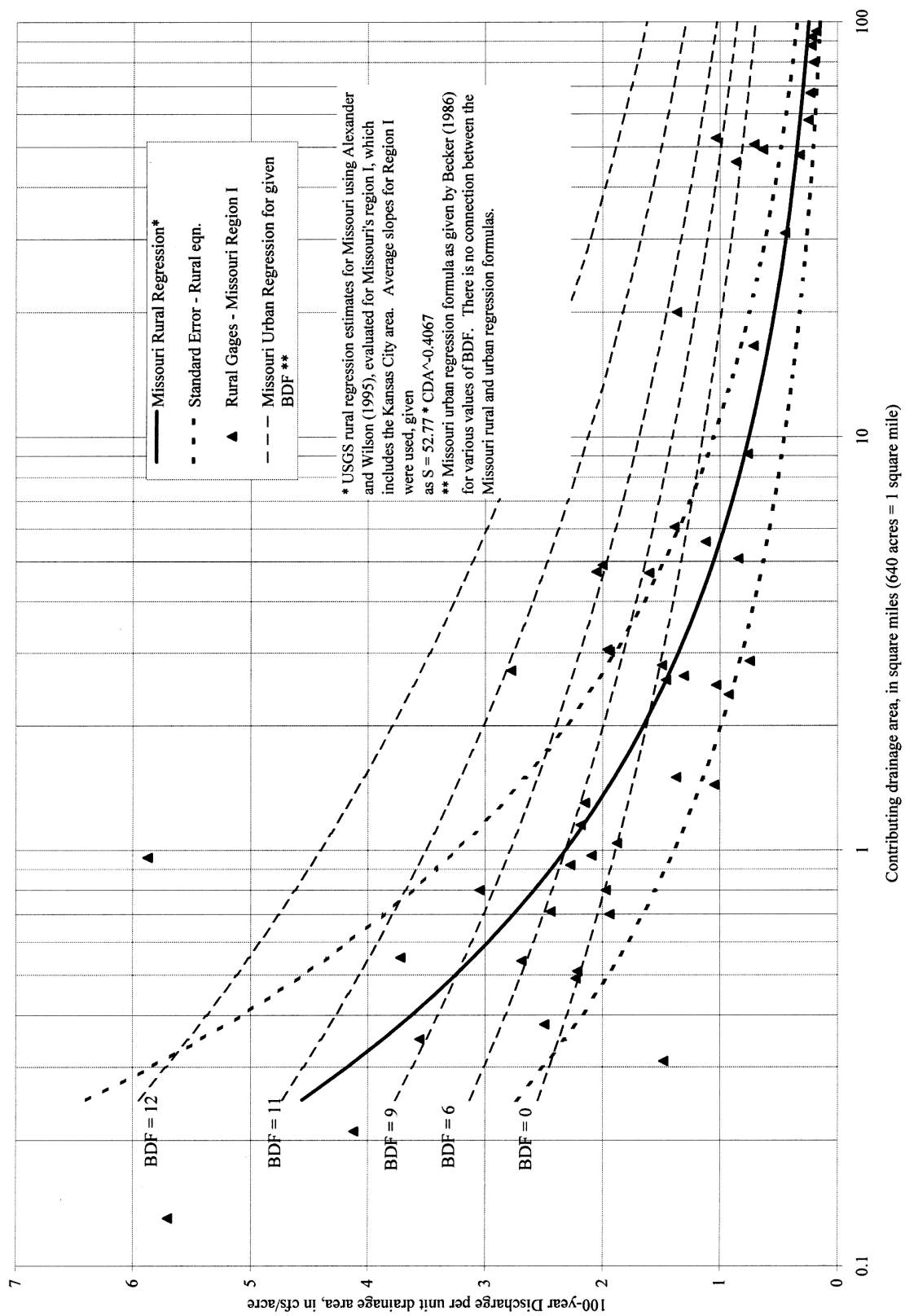
Table 5605-1
CRITICAL SHEAR STRESSES FOR CHANNEL MATERIALS

<u>Others</u>	
Jute net	0.46
Plant cuttings	2.09
Well established dense vegetation to the normal low water	2.16
Geotextile (synthetic)	3.01
Large Woody Debris	3.13

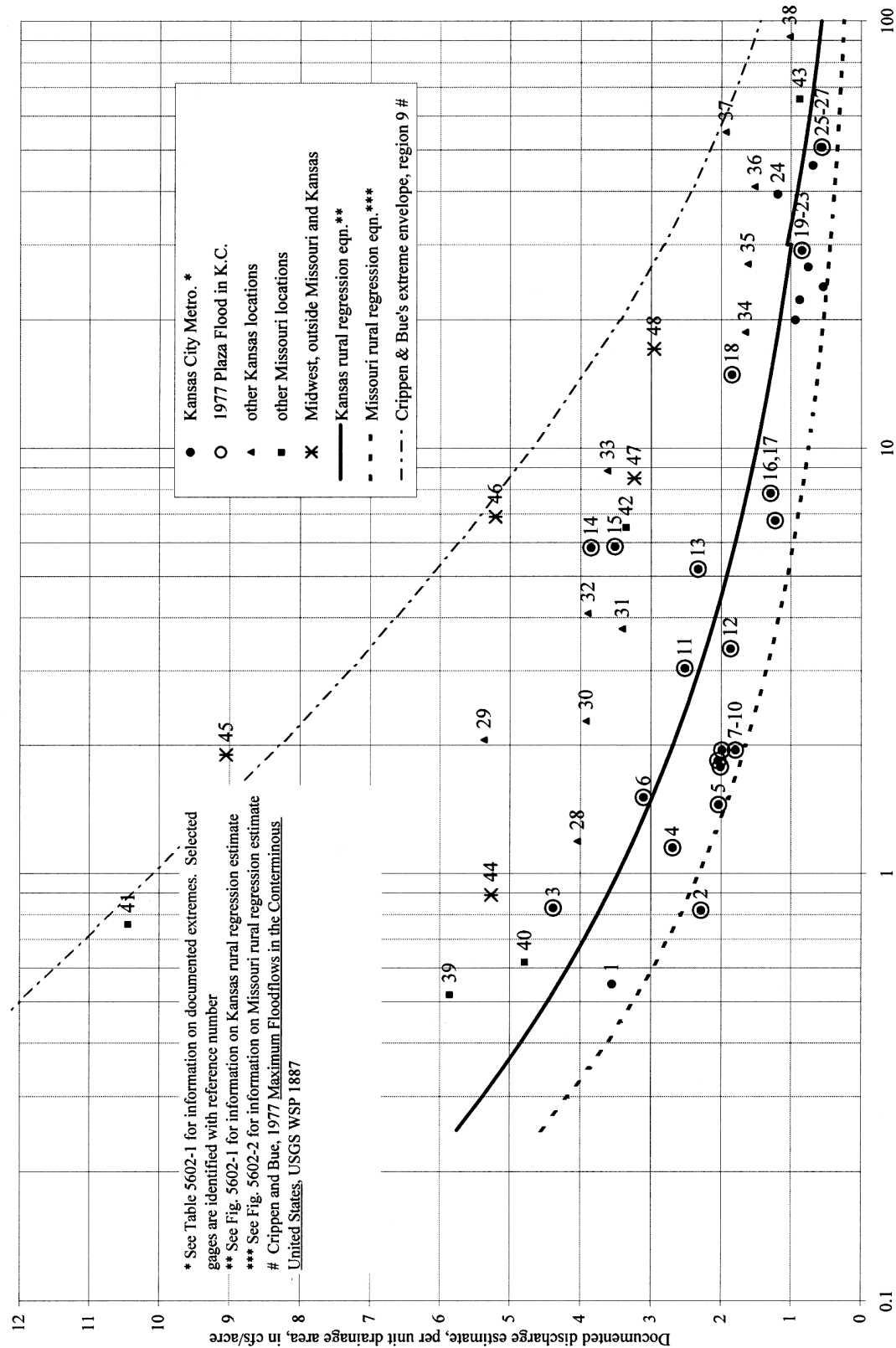
Note: For non-cohesive soils, the table values are based on spherical particles and Shield equation, as follows: $\tau_c = \Theta(\gamma_s - \gamma) D$ where γ_s is the specific weight of sediment (165 pcf), γ is specific weight of water, D is the reference particle size, and Θ is the Shield's parameter (0.06 for gravel to cobble, 0.044 for sand). For cohesive soils the values are based on limited testing as reported in Chow (1988) and USDA (2001).

Table 5606-1
Permissible Shear Stresses for Lining Material

Lining Category	Lining Type	lb/ft ²
General	Erosion Control Blankets	1.55-2.35
	Turf-Reinforced Matrix (TRMs): Unvegetated: Vegetated:	-----
		3.0
		8.0
	Geosynthetic Materials	3.01
	Cellular Containment	8.1
	Woven Paper Net	0.15
	Jut Net	0.45
	Fiberglass Roving: Single Double	-----
		0.60
		0.85
	Straw With Net	1.45
	Curled Wood Mat	1.55
	Synthetic Mat	2.00
Vegetative	Class A (see Table 5606-2)	3.70
	Class B (see Table 5606-2)	2.10
	Class C (see Table 5606-2)	1.00
	Class D (see Table 5606-2)	0.60
	Class E (see Table 5606-2)	0.35
Gravel Riprap	25 mm	0.33
	50 mm	0.67
Rock Riprap	150 mm	2.00
	300 mm	4.00
Bare Soil	Non-Cohesive	See Figure 5606-2
	Cohesive	See Figure 5606-3



**100-year Discharges, per Missouri Rural Regression Formula and Gage Estimates
Figure 5602-2**



Documented Extreme Streamflows (no return period estimated)
in Kansas City and the Region, as discharges per unit drainage area
Figure 5602-3

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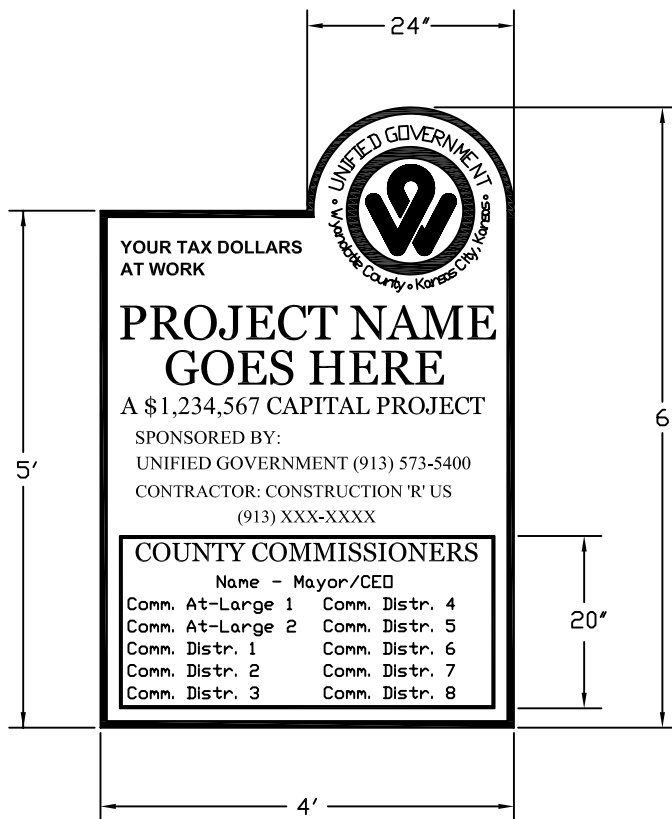
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6500-A	Manufactured Block Retaining Wall For Use With Inlet Or Sidewalk

SECTION 7100 – TREES AND SHRUBS

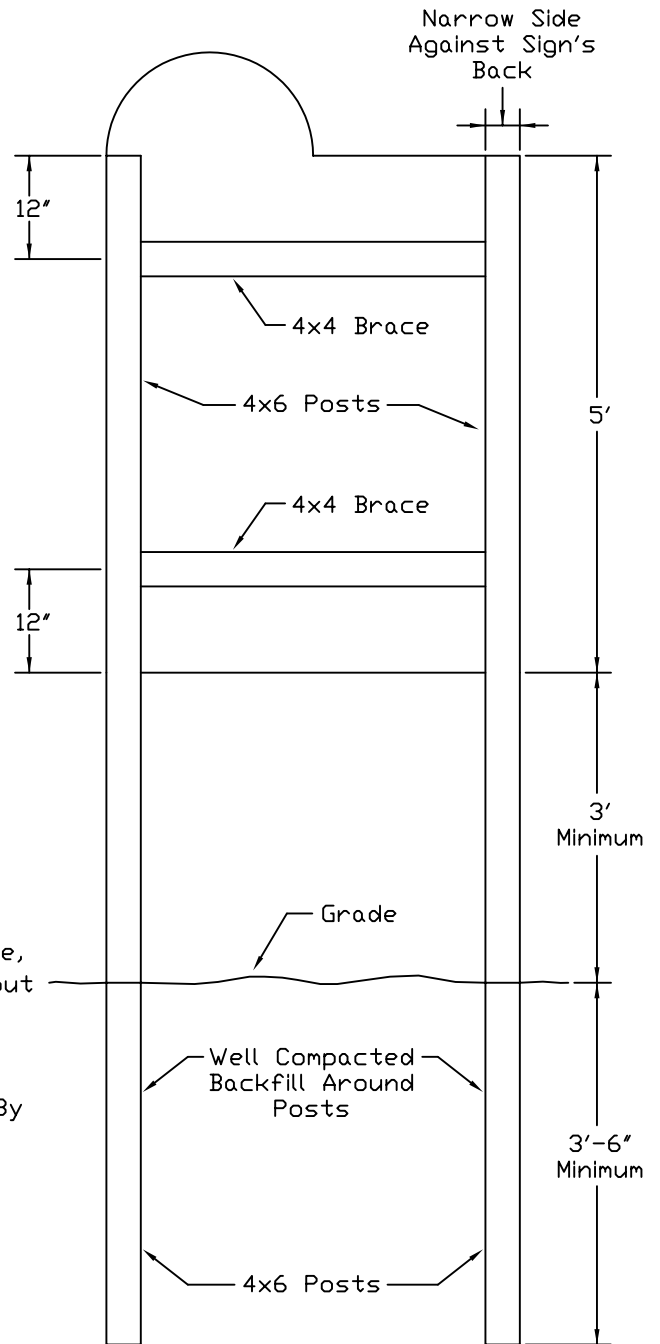
7100-A	Tree Planting



For Projects Scheduled to Last 45 Calendar Days Or Longer At A Fixed Location

NOTES:

1. Sign Shall Be Black On White Background, Of Durable, Weatherproof Construction, With Professional Layout & Lettering, Sample Layout Shown, Submit Actual Layout To Engineer For Approval.
2. Project Sign Required Only For Work Administered By Unified Government Public Works Department.
3. Emergency Repairs Do Not Require A Sign.
4. Posts Shall Be Built To Breakaway As Per KDOT Standards.
 - a. A Skid Mount Is An Acceptable Alternate To Buried Post Foundation.
5. Frame & Post & Skids If Used Shall Be 4x6 Weatherproofed Timbers.
6. Names Of Current Mayor & Commissioners May Be Obtained From The UG Commissioners Office: (913) 573-5040

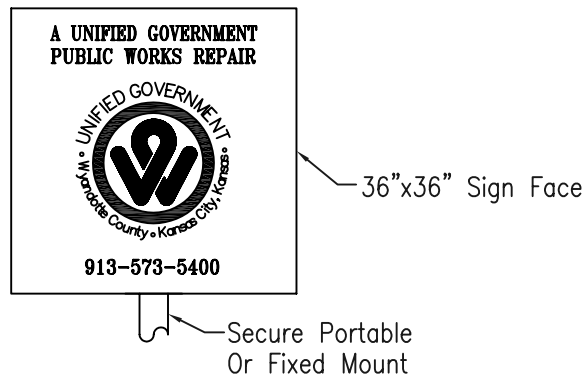


PROJECT SIGN

PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION

UNIFIED GOVERNMENT

UG 1000-A
2008 Edition



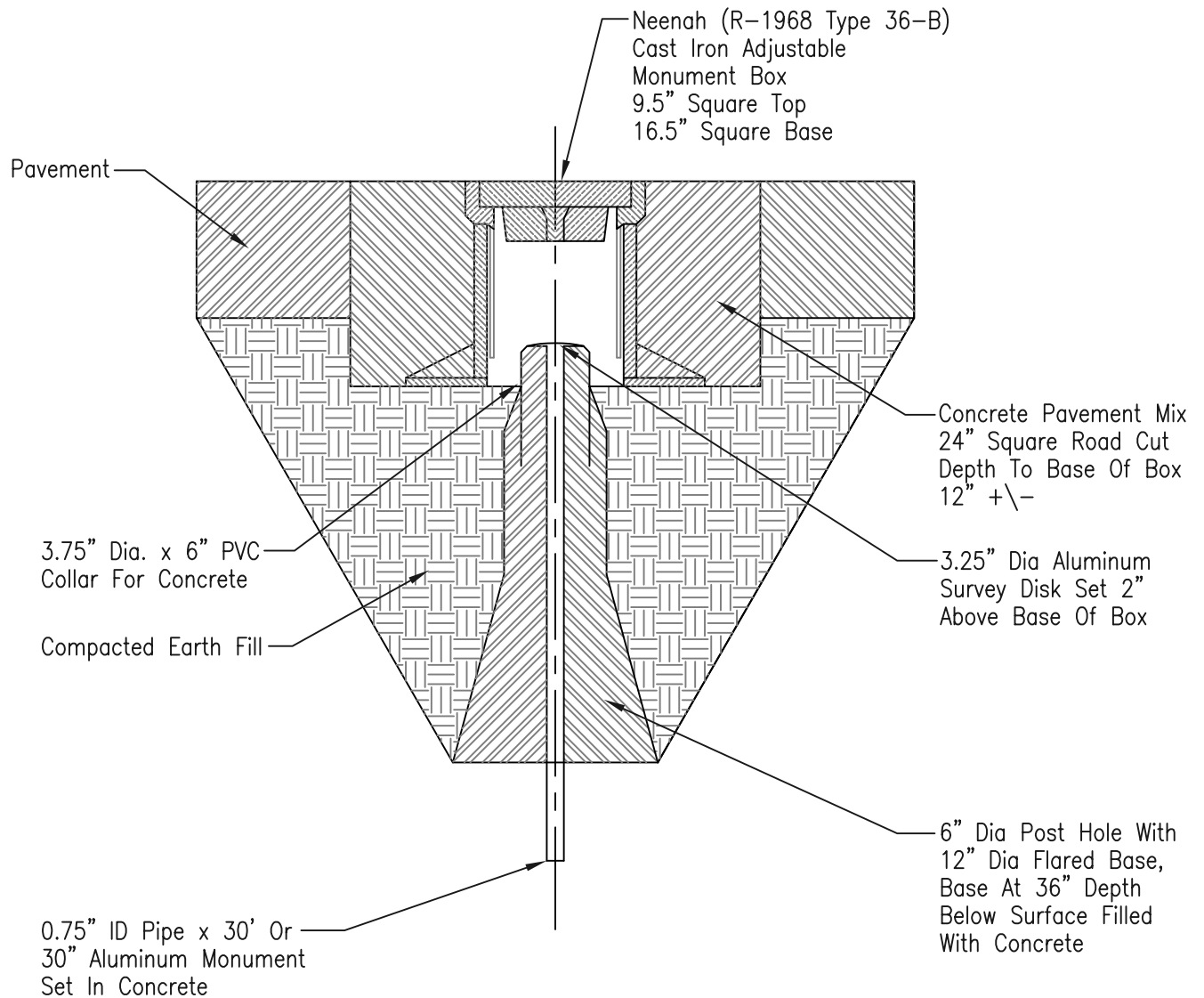
For Spot Repairs Or Projects Scheduled To Last Less Than 45 Calendar Days At A Single Site

NOTES:

1. Sign Shall Be Black On White Background, Of Durable, Weatherproof Construction, With Professional Layout & Lettering, Sample Layout Shown, Submit Actual Layout To Engineer For Approval.
2. Project Sign Required Only For Work Administered By Unified Government Public Works Department.
3. Emergency Repairs Do Not Require A Sign.

**PROJECT SIGN FOR PROJECTS OF SHORT DURATION
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT**

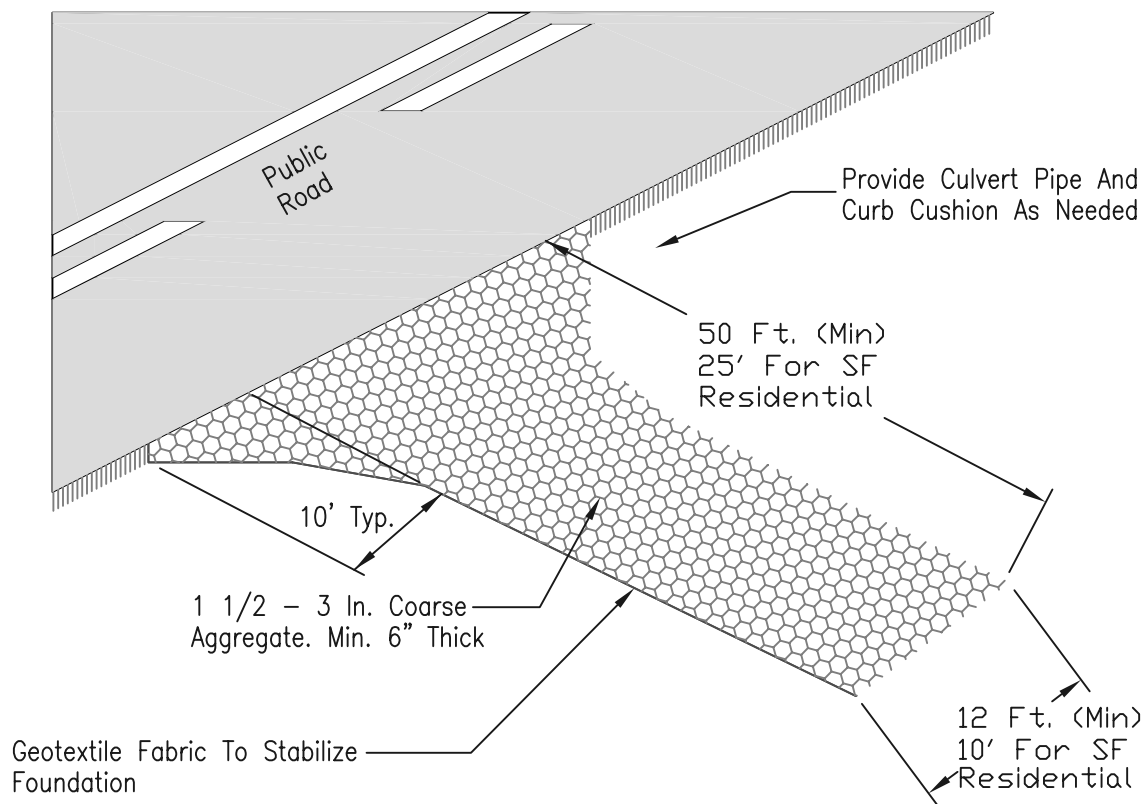
UG 1000-B
2008 Edition



NOTE:
All Work Shall Be Carried Out Under
The Direction Of A Kansas Registered
Professional Land Surveyor, & Subject
To Inspection By U.G. Surveyor.

REPLACEMENT OF GOVERNMENT CORNER MONUMENT IN PAVED AREA
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT

UG 1200-A
2008 Edition

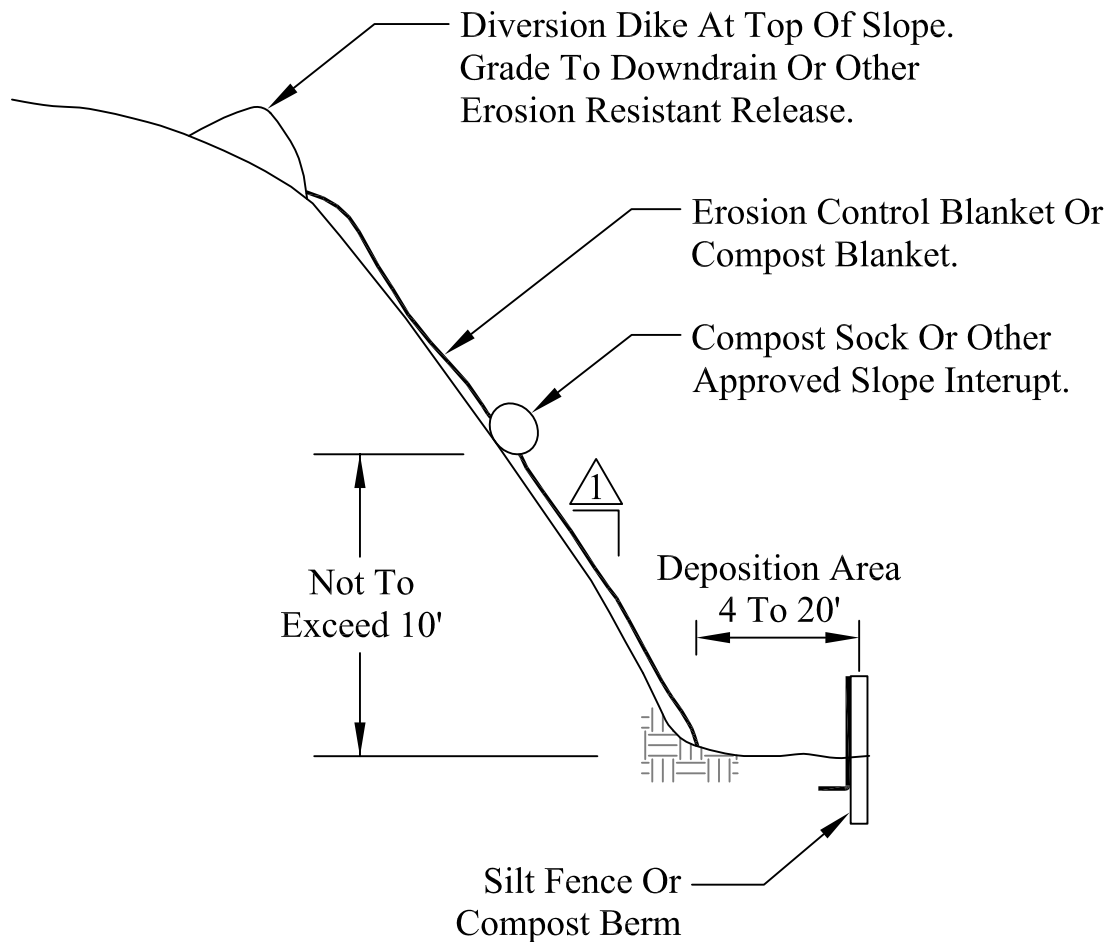


NOTES:

1. Renew Aggregate When Mud From Tires, Encroachment Of Sub Soil Or Loss Of Loose Aggregate Cause Fines To Fill More Than 25% Of Surface Voids.
2. Avoid Locating On Steep Slopes Or At Curves On Public Roads. If Possible, Locate Where Permanent Roads Will Eventually Be Constructed.

CONSTRUCTION VEHICLE ENTRY
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT

UG 1400-A
 2008 Edition

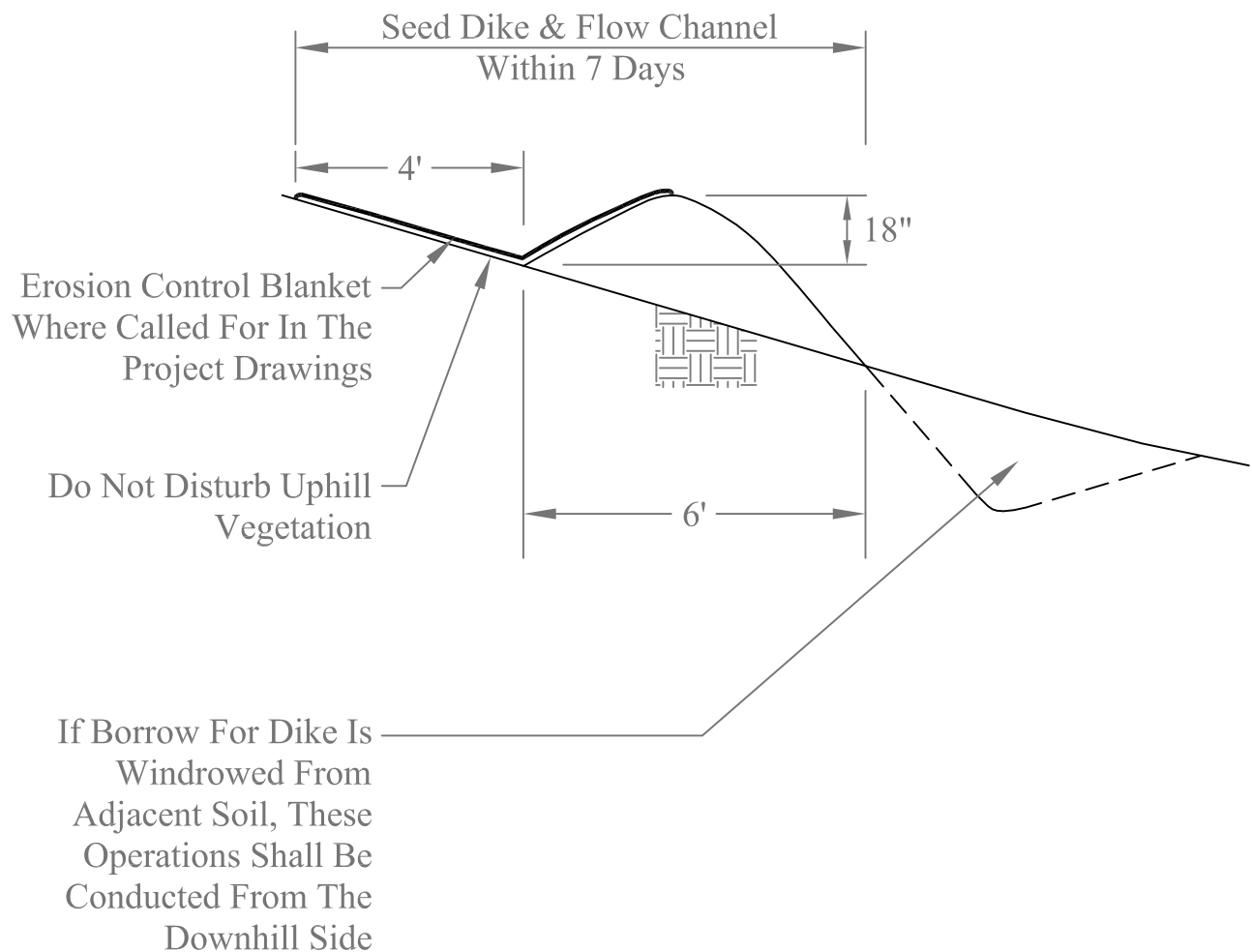


Vertical Scale Exaggerated

① Steep Slope Protection Applies To All Slopes Steeper Than 15%.

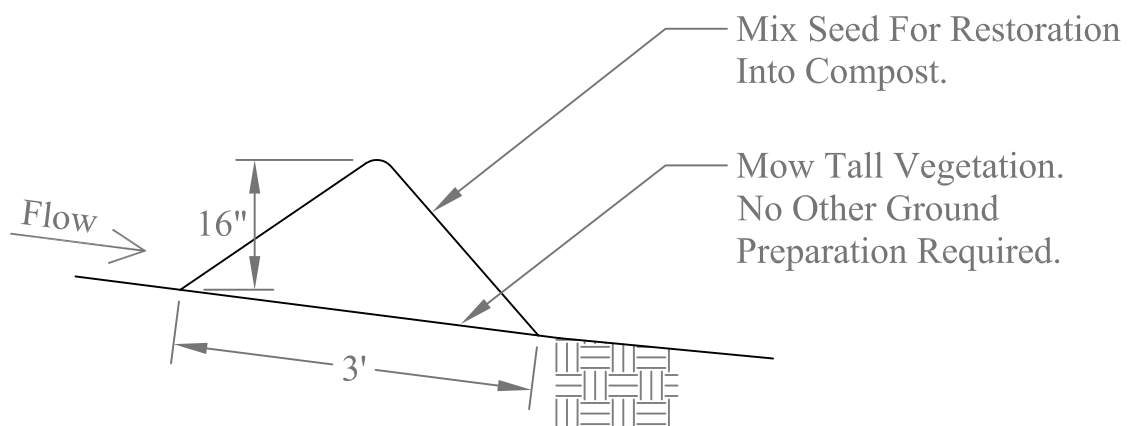
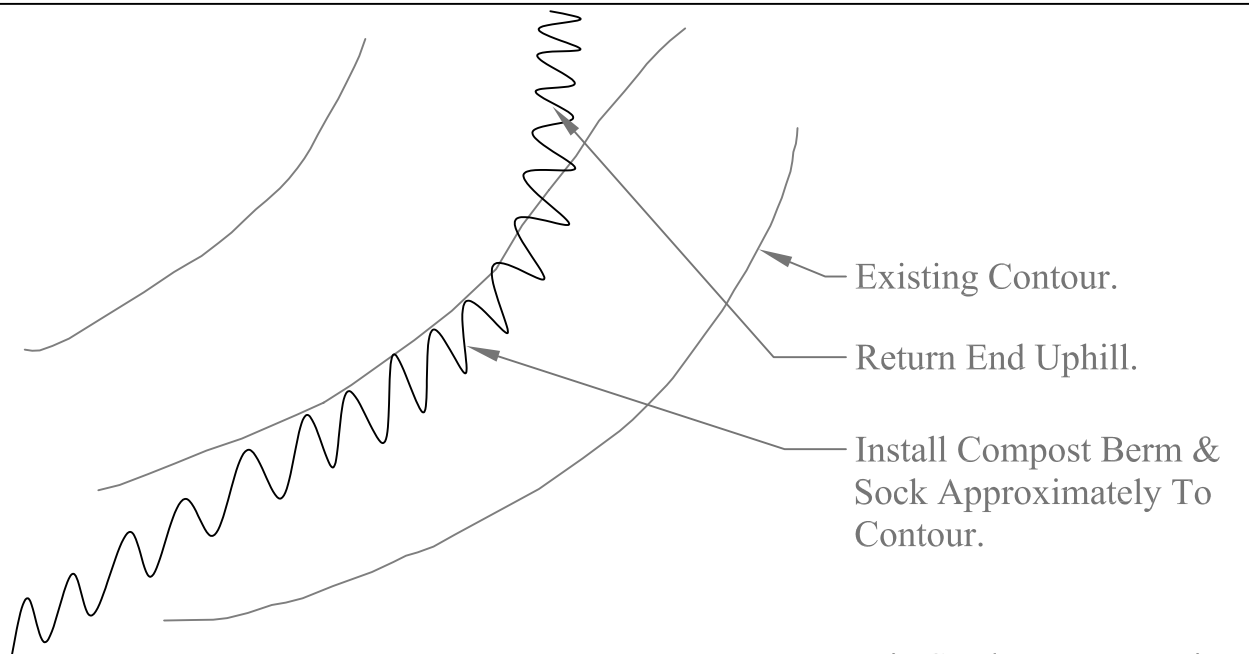
STEEP SLOPE PROTECTION
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT

UG 1400-B
2008 Edition

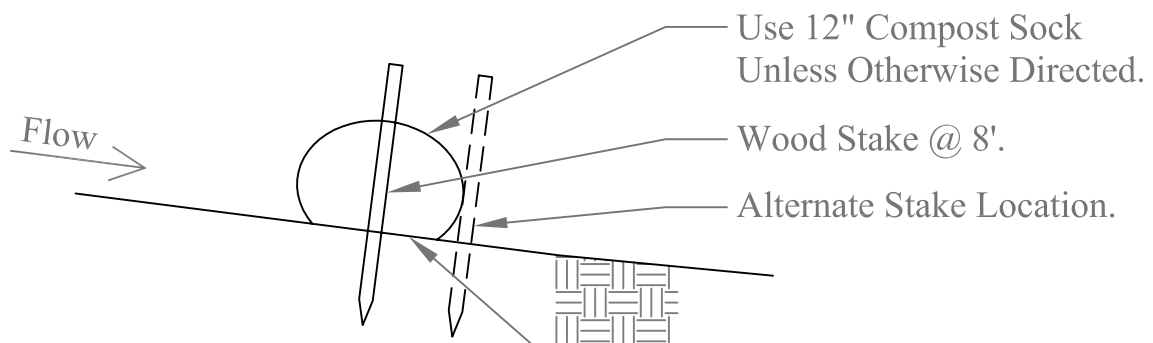


DIVERSION DIKE
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT

UG 1400-C
2008 Edition

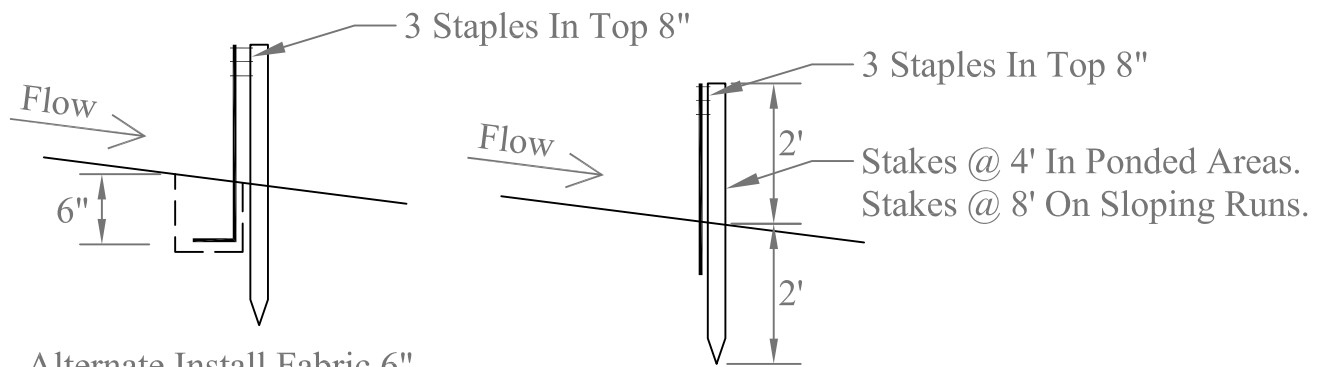
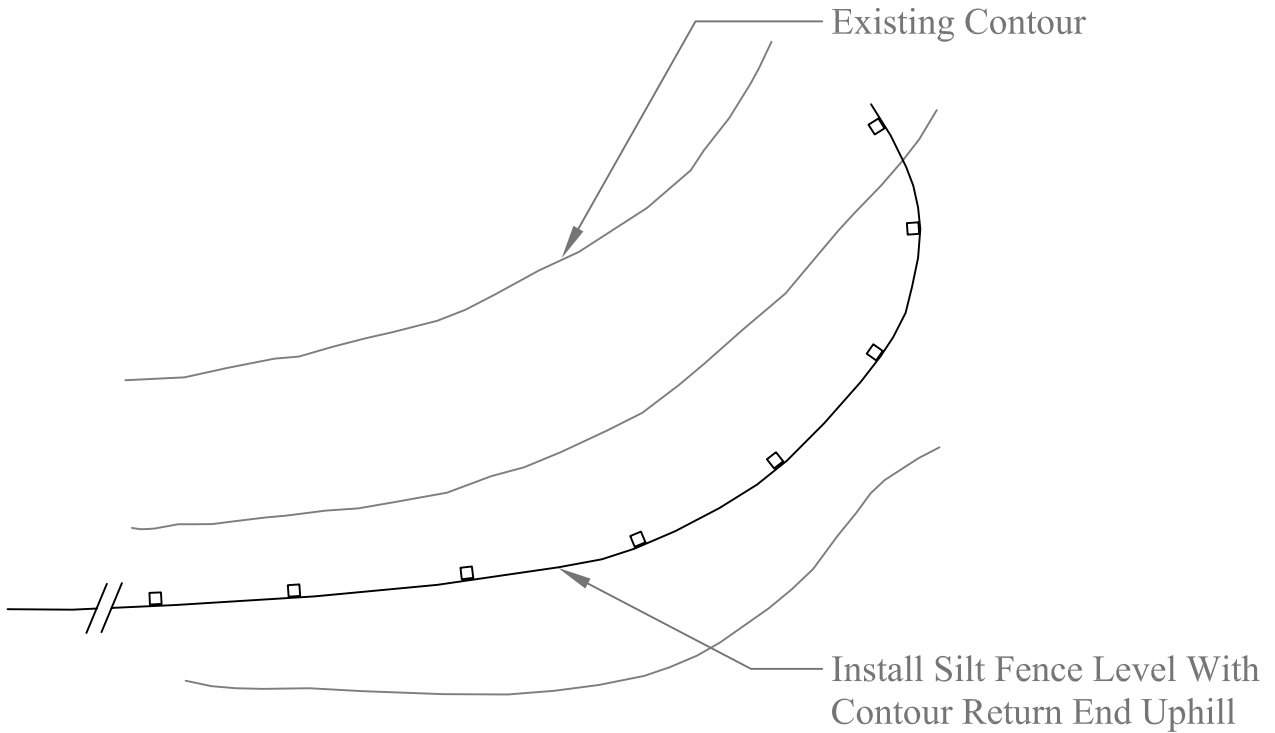


Compost Berm



Compost Sock

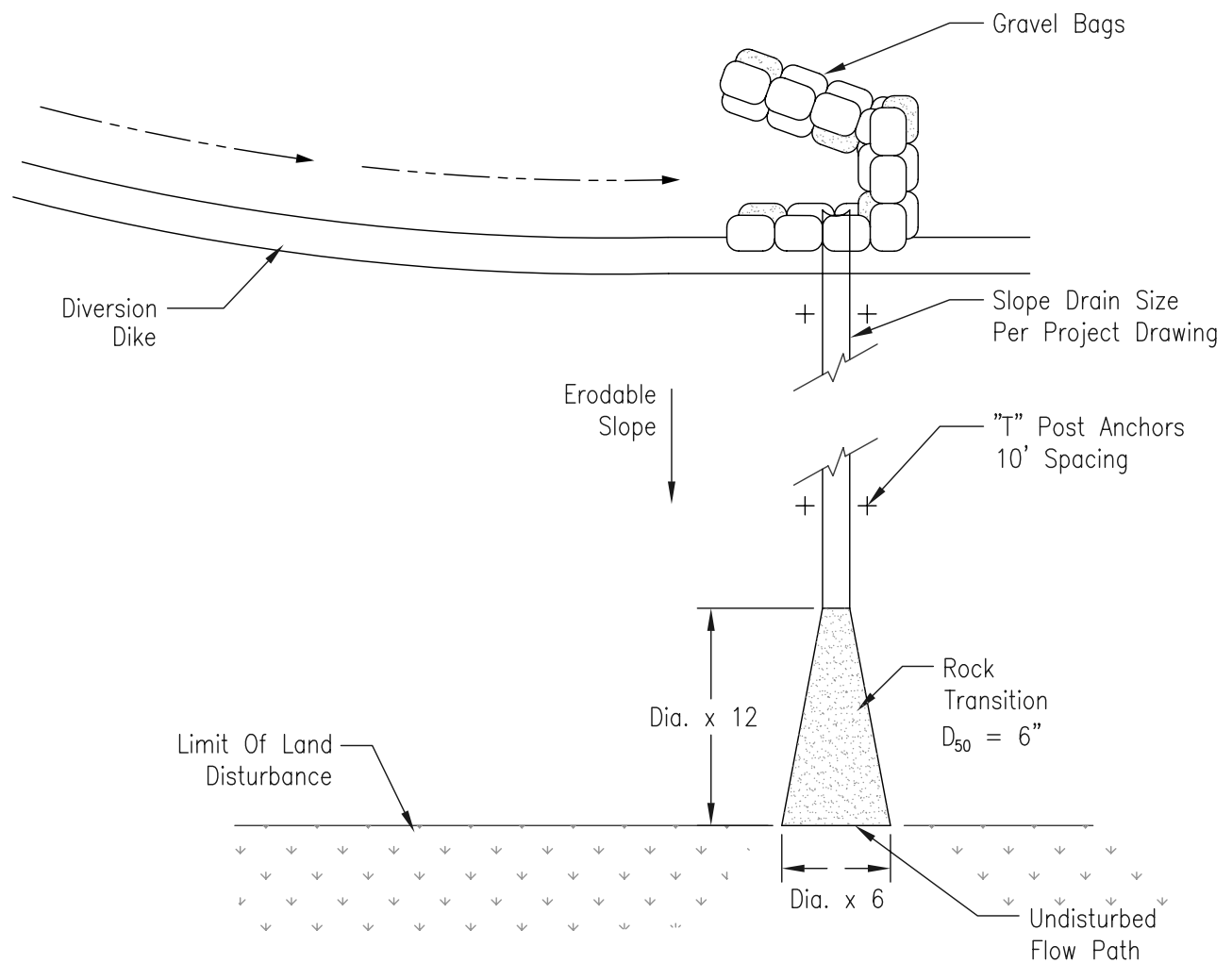
COMPOST BERM AND COMPOST SOCK
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT



Alternate Install Fabric 6"
Into Trench Backfill &
Compact. Use Trench
Method Only For
Inaccessible Areas, Short
Runs Or Rocky Soil.

Fabric Sliced
6" Into Ground
By Slicer.

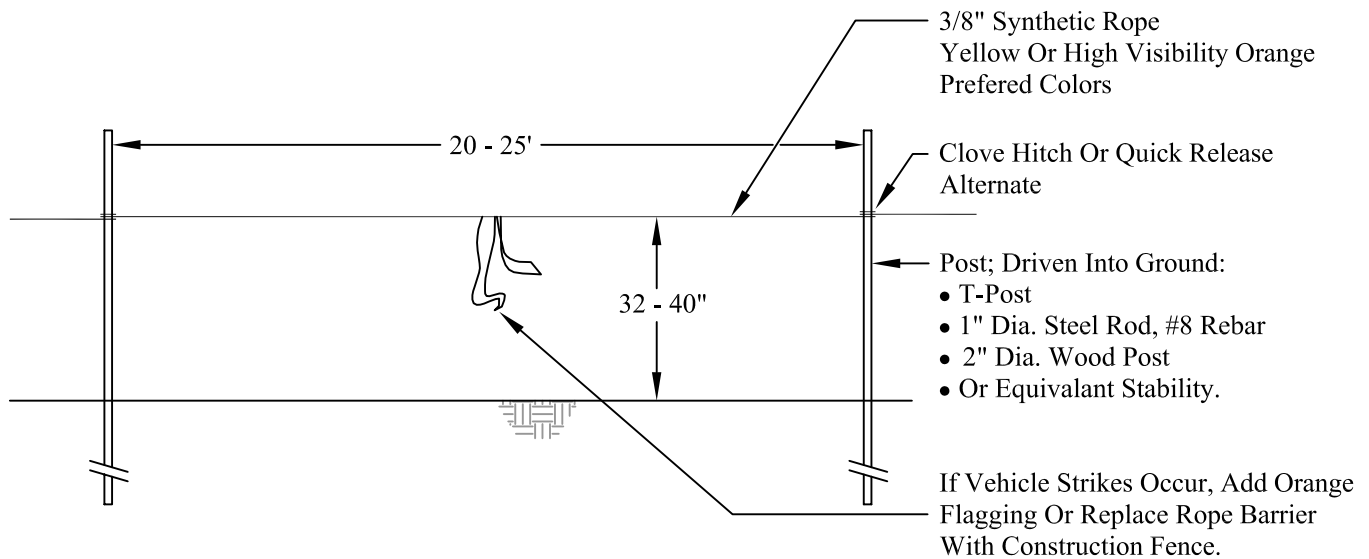
SILT FENCE INSTALLATION
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT



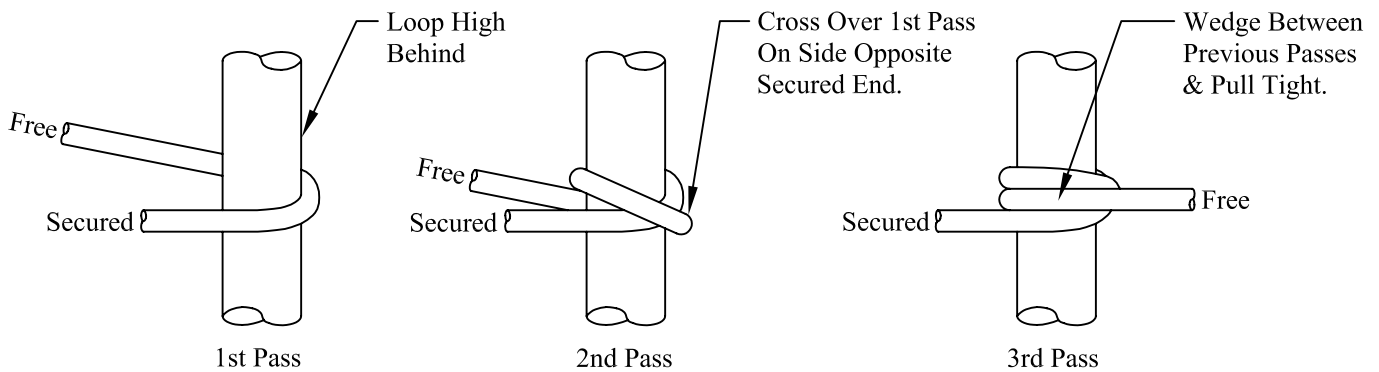
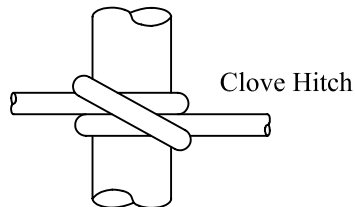
Note: For Temporary Erosion Control Only

SLOPE DRAIN
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT

UG 1400-F
 2008 Edition



Typical Dimensions & Materials



Quick Release Alternate to Clove Hitch



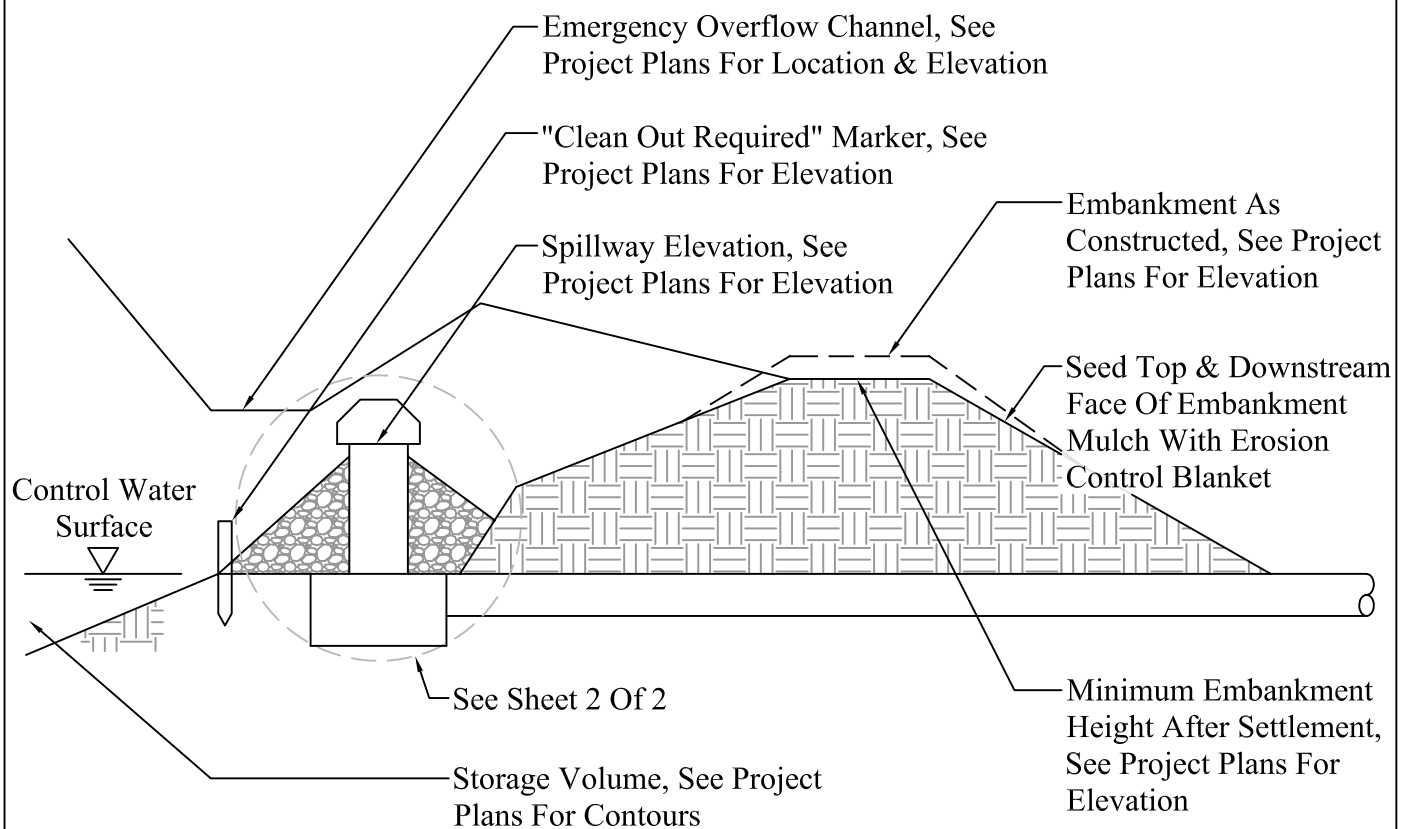
Note: Quick Release Alternate Must Be Kept
Taut Throughout Placement. Not For
Use On End Posts.

ROPE BARRIER

PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION

UNIFIED GOVERNMENT

UG 1400-H
2008 Edition

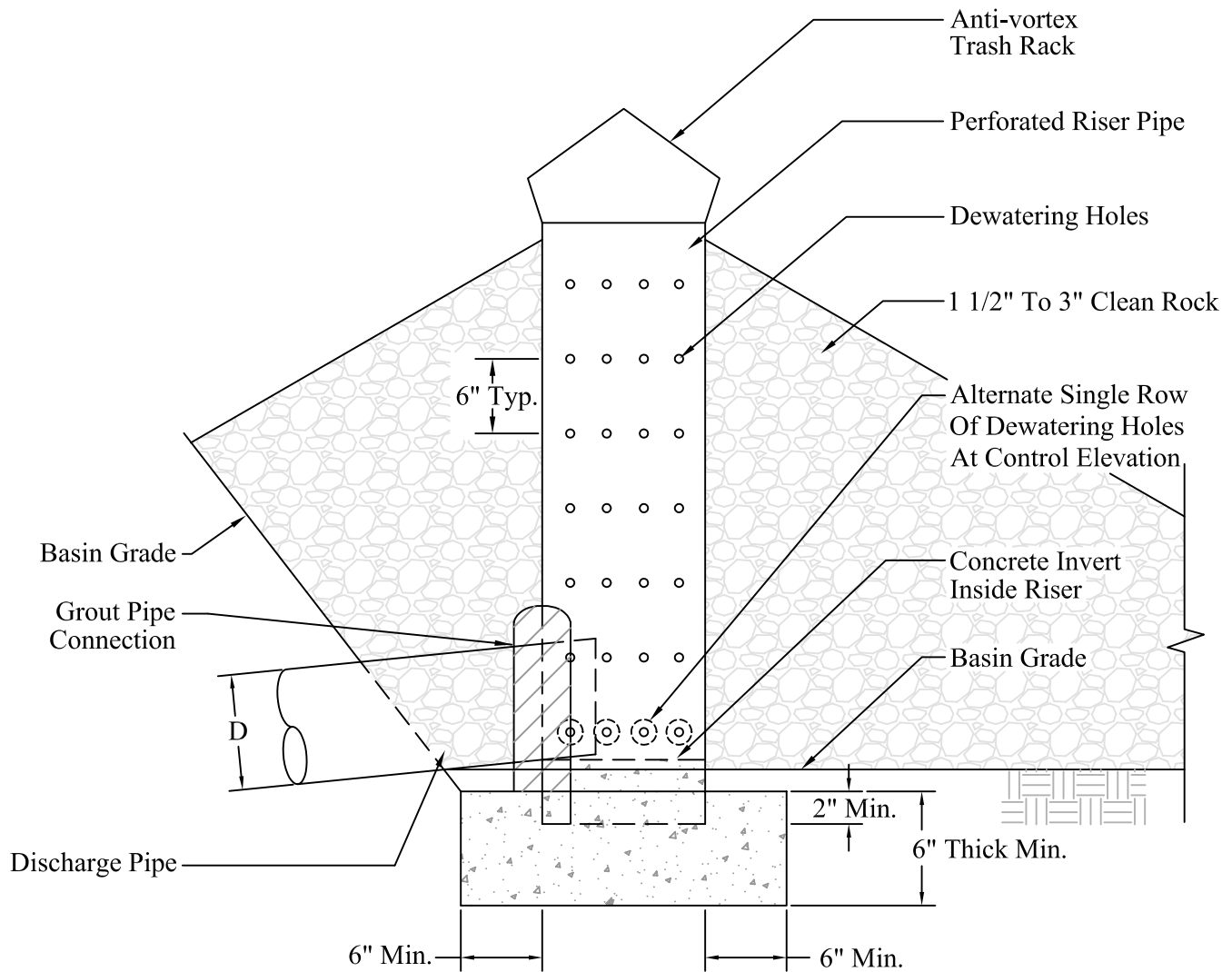


SECTION THROUGH EMBANKMENT AND BASIN CONTROLS

NO SCALE

SEDIMENT BASIN OUTLET, SHEET 1 OF 2
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT

UG 1400-I
2008 Edition



NO SCALE

NOTES:

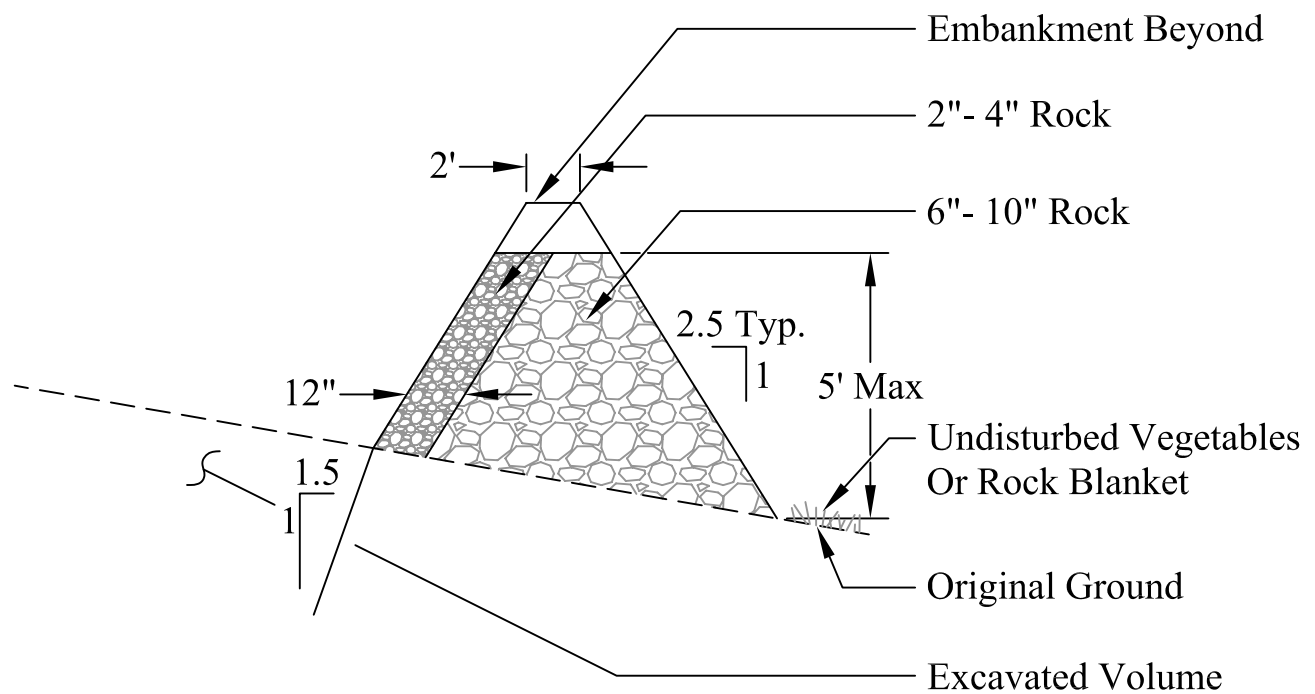
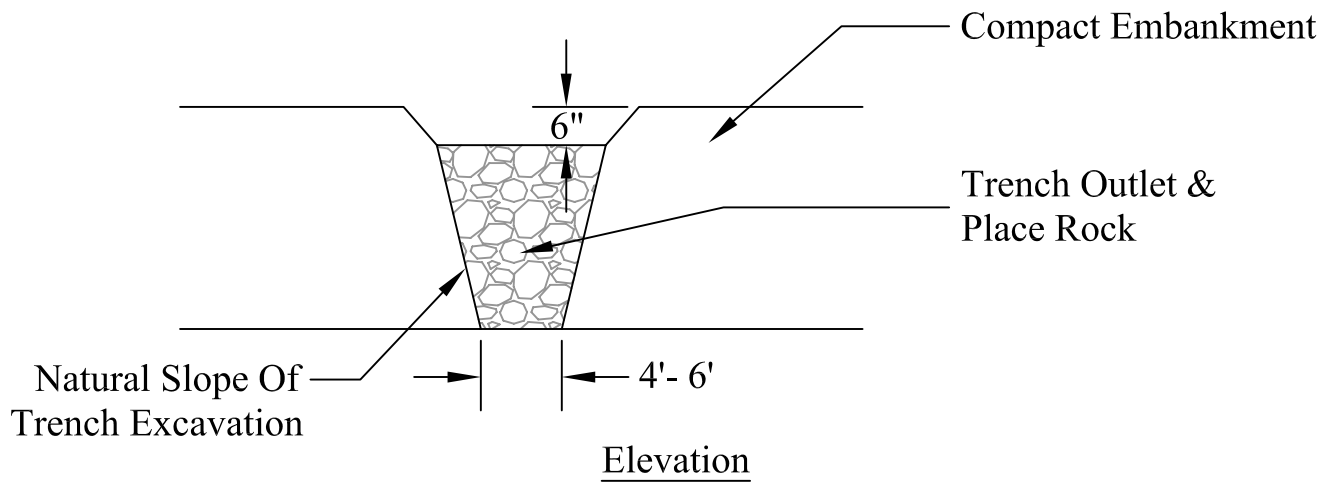
1. See Project Plans Or Design Guidelines For Diameter Of Pipes And Size And Number Of Dewatering Holes.
2. An Anti-Vortex And Trash Rack Shall Be Securely Installed On Top Of The Riser.
3. The Riser Shall Have A Base Attached With Sufficient Weight And Size To Prevent Flotation Or Over-Turning Of The Riser.

SEDIMENT BASIN OUTLET, SHEET 2 OF 2

PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION

UNIFIED GOVERNMENT

UG 1400-J
2008 Edition



Vertical Scale Exaggerated

Section

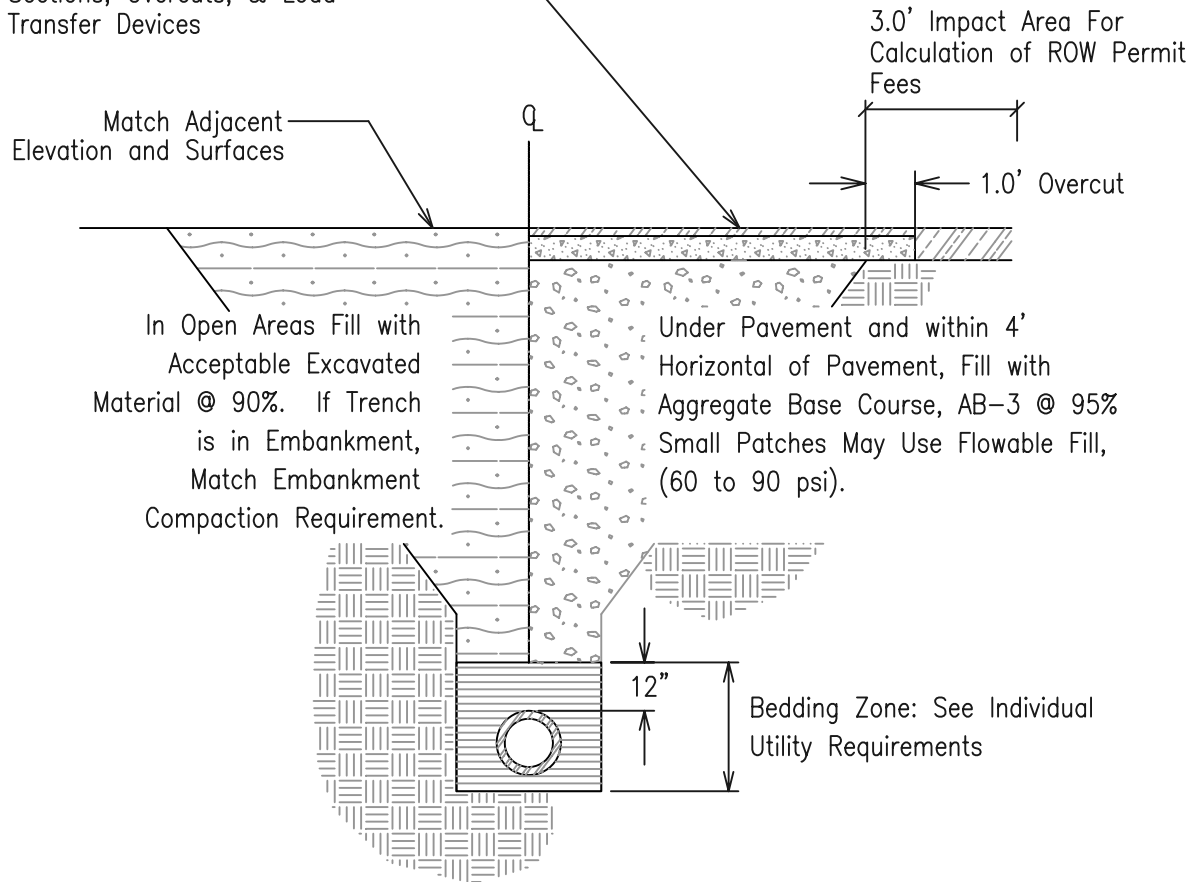
SEDIMENT TRAP OUTLET

PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION

UNIFIED GOVERNMENT

UG 1400-K
2008 Edition

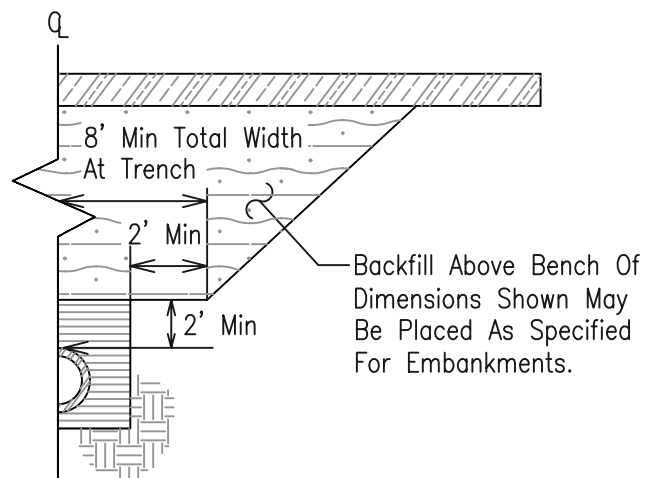
See Pavement Patch Details
Section 2250 For Required Pavement
Sections, Overcuts, & Load
Transfer Devices



TRENCH SECTION

NOTES:

1. If Rock Is Encountered Contact Engineer To Verify & Define Upper Limit Of Rock. See Individual Utility Requirements For Over excavation.
2. Shore Or Slope Sides Of Excavation. OSHA Has Additional Requirements For Excavations.
3. Thickness Of Lifts Must Match Compaction Methods.



ALTERNATE BACKFILL

TRENCH DETAIL

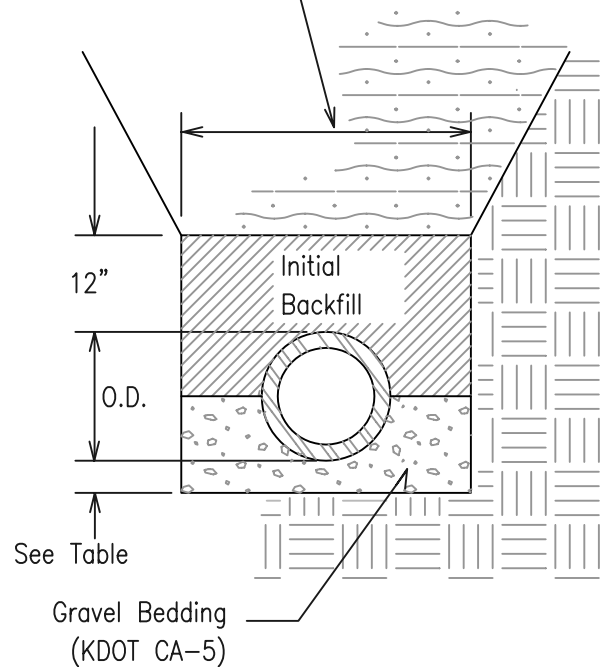
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT

UG 2100-A
2008 Edition

Width Shall Not Exceed 2 1/2
Times The Outside Pipe Diameter.

Initial Backfill Allowable Materials		
Application	Select Fill	Stone Fill
Paved Areas, All Materials & Depths	No	Yes
Open Areas, Rigid Pipes, Depths to 30'	Yes	Yes
Open Area, Flexible Pipe, Depths to 30'	Yes	Yes

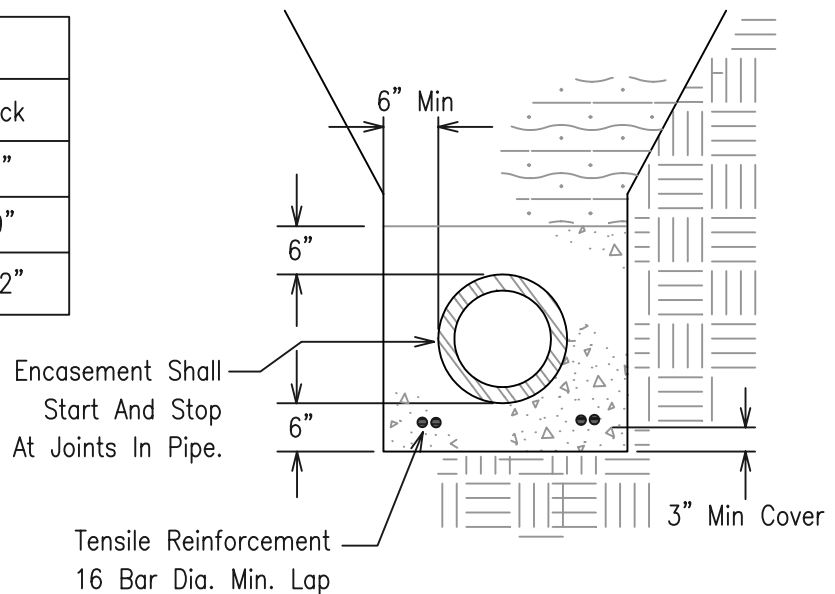
See Section 2100 For Definition Of Stone Fill
& Select Fill



STANDARD SEWER BEDDING

Bedding Depth Below Pipe		
Pipe Diameter	In Soil	In Rock
24" & Less	4"	6"
27" through 60"	4"	9"
66" & Greater	6"	12"

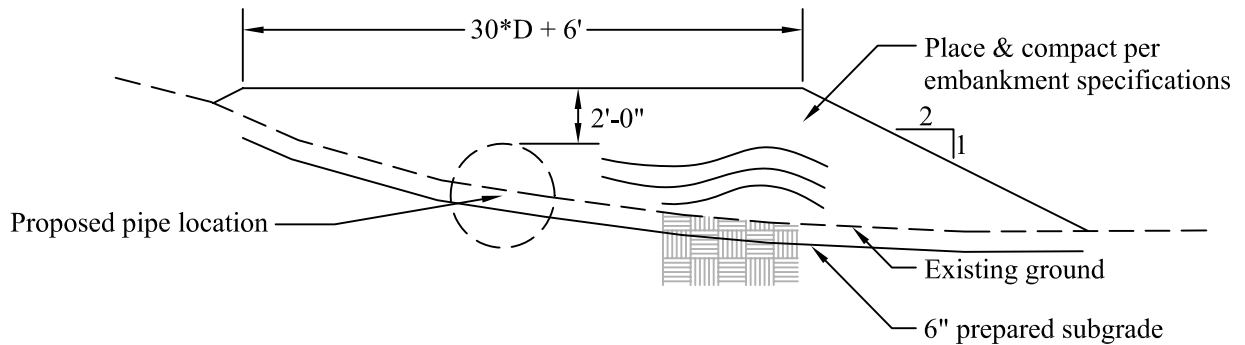
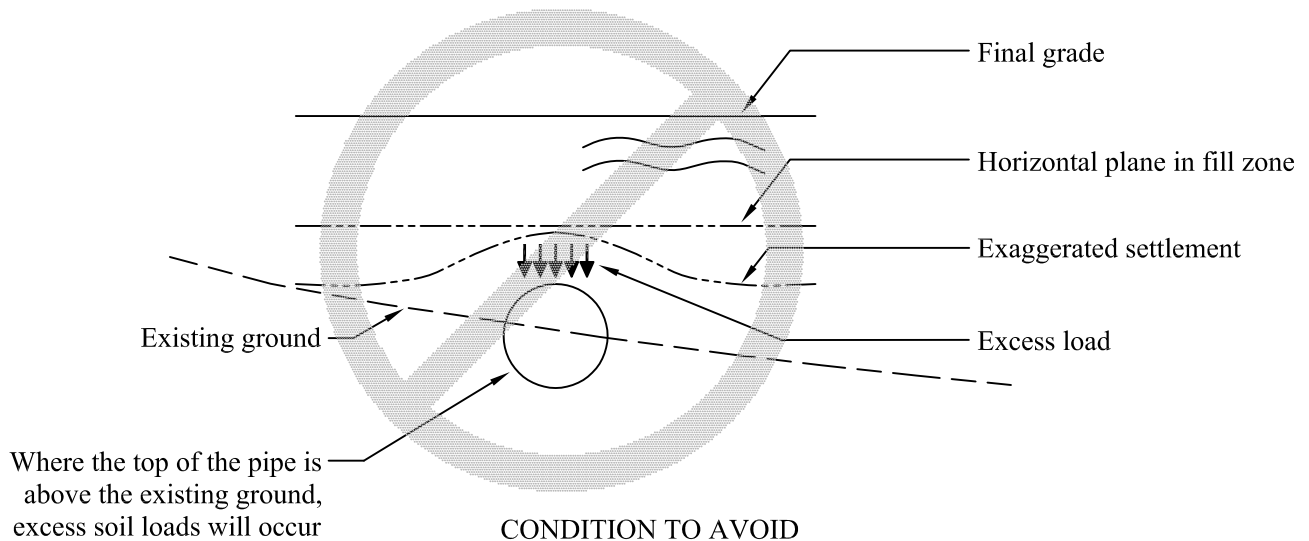
Concrete Encasement Minimum 6"
Beyond Outer Wall Of Pipe. Form or
Cast Against Trench Wall. Reinforcing
Steel Shall Be two #6 Bar for Pipe Up
To 8" Dia; Four #6 Bar for 10" Through
24" Dia; & as Approved By the Engineer
for Larger Than 24".



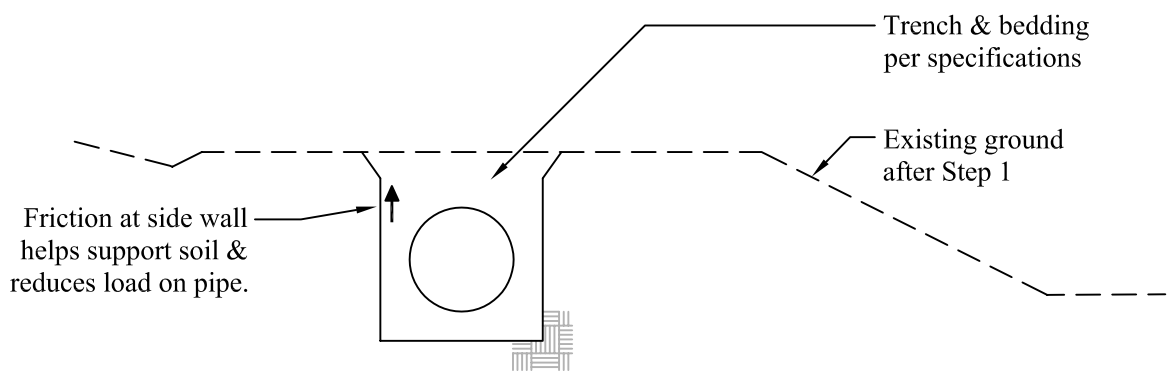
SEWER ENCASEMENT

SANITARY AND STORM SEWER BEDDING **PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION** **UNIFIED GOVERNMENT**

UG 2100-B
2008 Edition



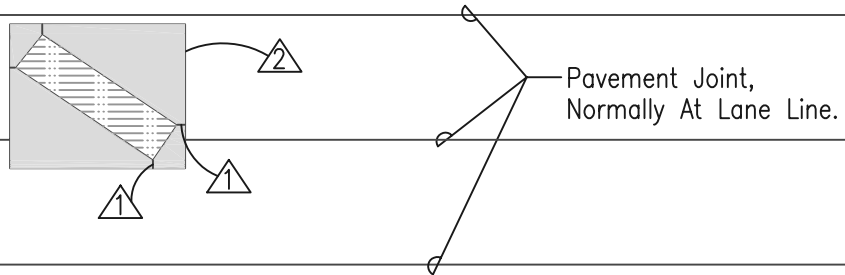
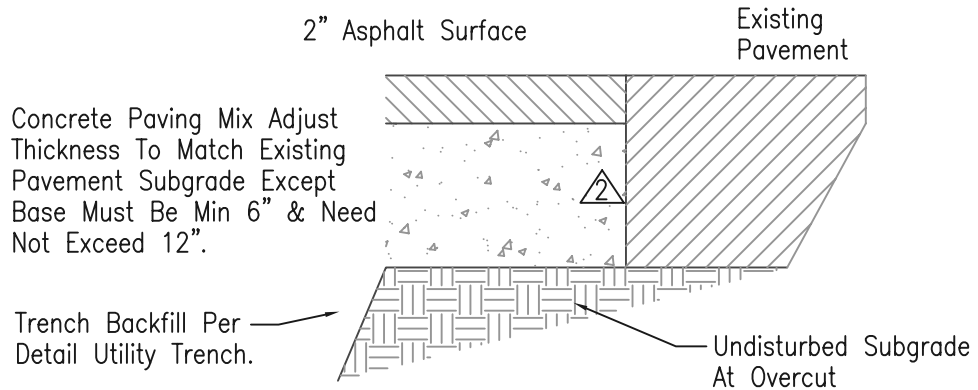
STEP 1: Build Earth Platform



STEP 2: Excavate Trench & Place Pipe

NO SCALE

PLATFORM FOR EXPOSED PIPE INSTALLATION
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT



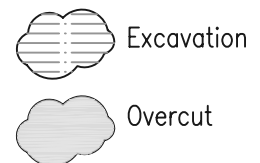
FLAG NOTES:

- ① Minimum Overcut Shall Be 1.0 Foot, Overcut Shall Be A Single Rectangle Oriented Parallel & Perpendicular to the Travel Lanes.
- ② No Load Transfer Devices Are Required At Overcut Joint.

SHEET NOTES:

- 1. Streets With Brick Base & Asphalt Overlay Shall Be Patched Per Asphalt Pavement Patch Details.
- 2. Refer To Specification For Asphalt & Concrete Mix, Tack, Placement, And Compaction Requirements.
- 3. Overcut Edges Shall Be Saw Cut Full Depth. Damaged Edges Shall Be Recut.

LEGEND

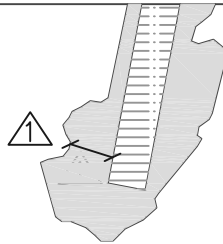
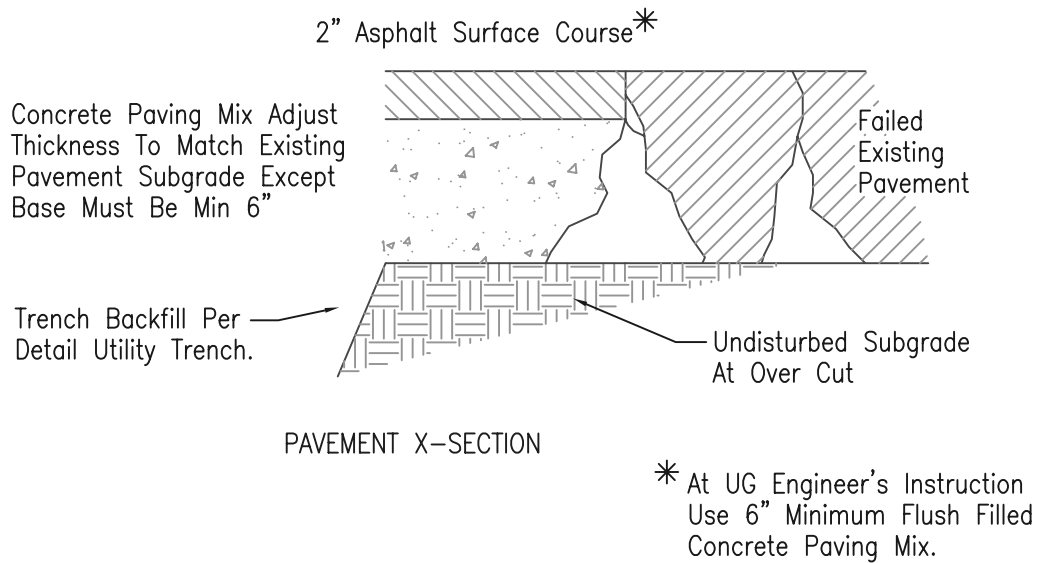


ASPHALT PAVEMENT PATCH

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UG 2250-A
2008 Edition



FLAG NOTES:

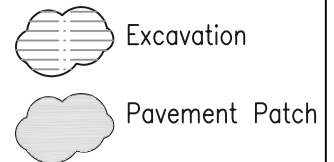
- ① To Maximum Extent Permitted By Pavement Condition, Locate A Saw Cut Between 6" & 2'-0" Of The Excavation. For Remainder Of Pavement Edge, Remove Dislodged Pavement Fragments With Minimum Disruption To Remaining Fragments. Any Shape Of Pavement Patch Acceptable In Failed Pavements.

SHEET NOTES:

1. Applicability: Failed Pavement Is Any Pavement So Fragmented That 30% Or More Of The Perimeter Of The Excavation Has A No Practical Saw Line Within 2 Feet Of The Excavation. "No Practical Saw Line" Shall Mean Sawing Would Dislodge Rather Than Cut The Pavement. UG Engineering Shall Determine.

2. Refer To UG Standard Specifications For Asphalt & Concrete Mix & Tack, Placement & Compaction Requirements.

LEGEND

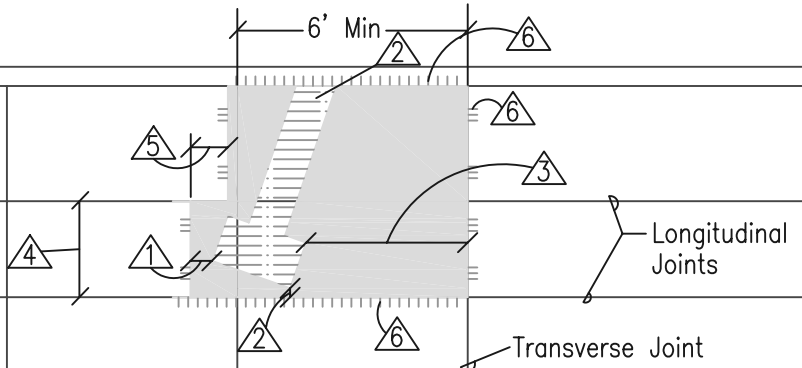
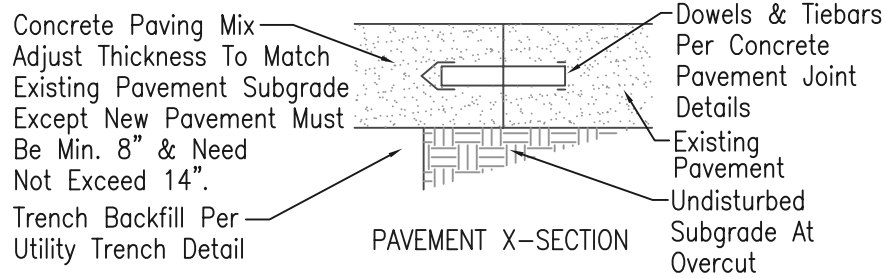


PAVEMENT PATCH IN FAILED PAVEMENTS

PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION

UNIFIED GOVERNMENT

UG 2250-B
2008 Edition



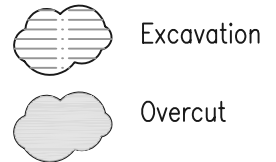
FLAG NOTES:

- ① Minimum Longitudinal Overcut In Mid-Panel Shall Be 1.0 Foot.
- ② Minimum Transverse Overcut 0.0 Foot.
- ③ Where Minimum Longitudinal Overcut Would Result In Remaining Panel Less Than 10' Long Between Cut & Transverse Joint Or Shrinkage Crack, Then Replace Panel To Transverse Joint Or Shrinkage Crack.
- ④ Patches Shall Extend From One Longitudinal Joint To Another. No Additional Overcut Is Required.
- ⑤ Where Patch Crosses Longitudinal Joint, Patch May Stagger Only If Stagger Is Greater Than 6 Feet.
- ⑥ Transverse Joint Dowels & Longitudinal Joint Tie Bars (Including Curb Tie Bars) Shall Be Installed Per Details For Concrete Pavement Joint Layout & Patching.

SHEET NOTES:

- 1. Streets With Brick Driving Surface Shall Be Patched Per Asphalt Pavement Patch Details.
- 2. If Asphalt Overlay Covers More Than 80% Of The Panels Surrounding The Cut, Then Restore Per Asphalt Pavement Patch Details.
- 3. Refer To UG Standard Specifications For Concrete Mix, Curing Requirements, And For Minimum Strength For Opening To Traffic.
- 4. Pavement Thickness And Finish Shall Match Thickness Of Adjacent Panels Except New Pavement Shall Not Be Less Than 8" Thick, Nor Greater Than 14" Thick.
- 5. Overcut Edges Shall Be Saw Cut Full Depth. Damaged Edges Shall Be Recut.

LEGEND



CONCRETE PAVEMENT PATCH

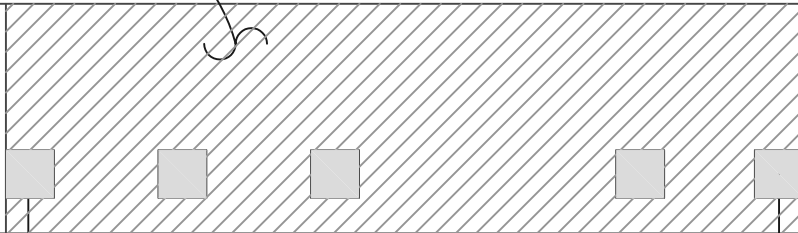
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION

UNIFIED GOVERNMENT

UG 2250-C
2008 Edition

②

Pavement Joint
Normally @ Lane Line



①

LEGEND



Overcut



Additional Mill &
Overlay Beyond
Over Cut

FLAG NOTES:

①

When 3 Or More Patches Over The Same Utility, Whether As Part Of The Current Repair Or A Previous Repair, Are Separated By An Average Center-To-Center Distance Of 25 Feet Or Less The Mill And Overlay Requirement Shall Be Applicable. Intermediate Gaps Of Greater Than 25 Feet Shall Be Incorporated In The Merge Patch As Long As The Average c-c Distance Requirement Is Met.

②

Minimum 2" Depth Mill & Overlay Full Width Of All Lanes Multiple Patches Encroach. Overlay Shall Be Placed By Paving Machine. Terminal Header Shall Align Across All Lanes To Be Over Laid.

EXCEPTIONS TO THIS RULE WILL BE AT THE ENGINEER'S DISCRETIONS. FACTORS TO BE CONSIDERED ARE:

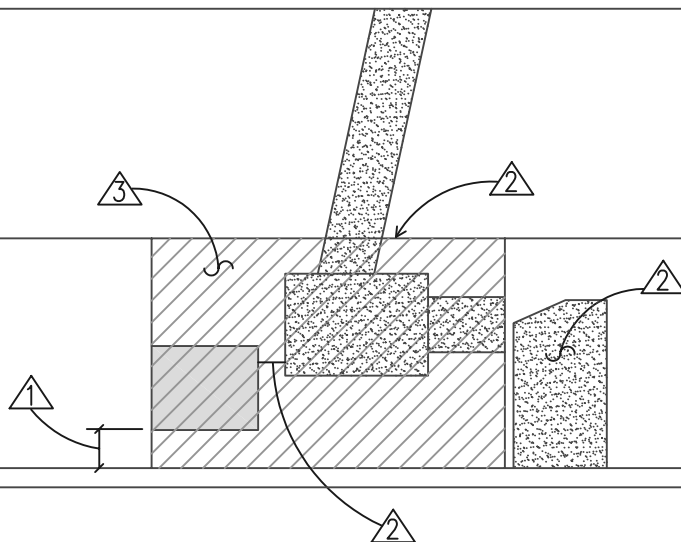
- A. The Condition Of The Unpatched Pavement. The Worse The Unpatched Pavement, The Less Need To Merge The Patch. Failed Pavements May Not Require Any Merging Of Patches.
- B. Alignment Of The Multiple Patches. The Closer The Patches Are To The Wheel Path, The Greater The Need To Merge Patches.
- C. The Total Number Of Multiple Patches. The Greater The Number Of Patches, The Greater Need To Merge The Patches.
- D. The Average & Maximum Distance Between Multiple Patches. The Greater The Average Or Maximum distance, The Less Need To Merge Patches.
- E. The Location Of Lane Lines And Pavement Joints. Preference Given To Merging Patches In The Same Lane.

PATCH MERGING – CASE 1

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UNIFIED GOVERNMENT

UG 2250-D
2008 Edition



FLAG NOTES:



If Standard Overcut Would Be Less Than 2' From The Curb And Gutter, Then Extend The Patch To The Gutter Line.



Merge Every Existing Patch Whose Edge Is Less Than 9' From A Rectangle Drawn Around The Standard Overcut And All Closer Patches That Meet The Same Requirement. This Is A Recursive Determination With No Set Limit Of Intermediate Patches.

Exceptions To This Rule Will Be At The Engineer's Discretion. Factors To Be Considered Are:

- A. The Surface Texture And Structural Soundness Of The Existing Patch. The Better The Existing Patch, The Less Need To Merge The Patch.
- B. The Condition Of The Unpatched Pavement. The Worse The Unpatched Pavement, The Less Need To Merge The Patch. Failed Pavements May Not Require Any Merging Of Patches.
- C. The Continuity Of The Existing Patch To The Standard Overcut. The Greater The Number Of Intervening Patches, The Less The Need To Join The Patch.

D. The Size Of The Merged Patch. The Larger The Merged Patch, The Less Need To Merge Additional Existing Patches.

E. The Location Of Lane Lines And Pavement Joints. Preference Given To Merging Patches In The Same Lane.



Merged Patch Shall Be Full Depth Pavement Replacement Or 2" Mill And Overlay At Engineer's Discretion. Overlay Shall Be Placed By Paving Machine. Factors To Be Considered Are:

- A. The Structural Soundness Of The Existing Patch. The Better The Existing Patch, The Less Need For Full Depth Pavement Replacement.
- B. The Condition Of The Unpatched Pavement. The Better The Unpatched Pavement, The Less Need For Full Depth Replacement.

LEGEND



Standard Overcut



Existing Patch

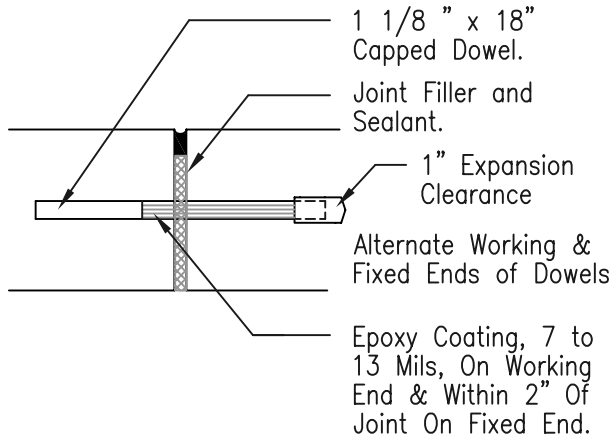


Area Of Merged Patch

PATCH MERGING – CASE 2

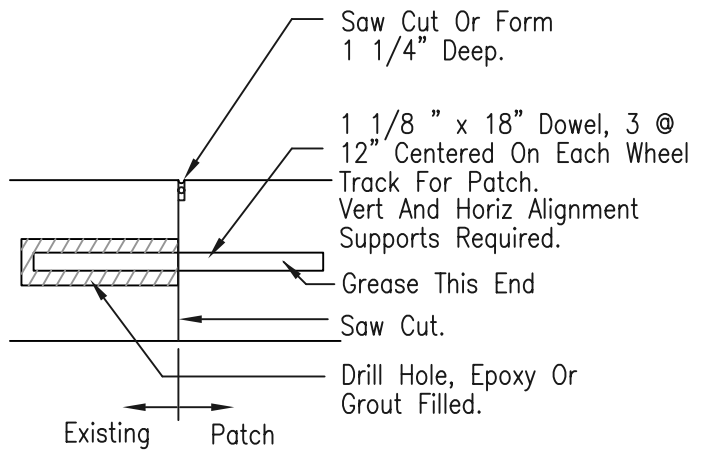
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT

UG 2250–E
2008 Edition

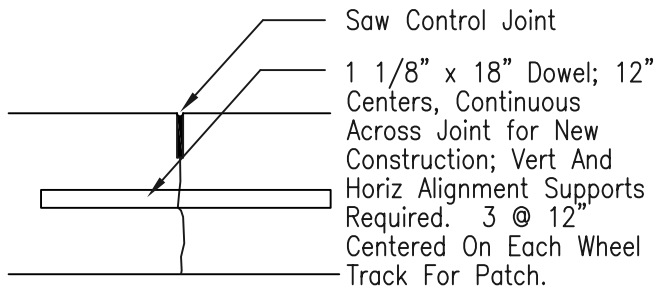


EXPANSION JOINT

Space Expansion Joints As Shown On Project Drawings

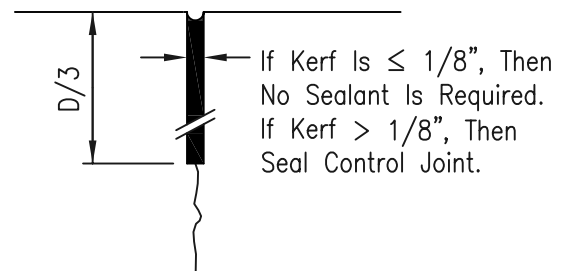


TRANSVERSE JOINT AT PATCH



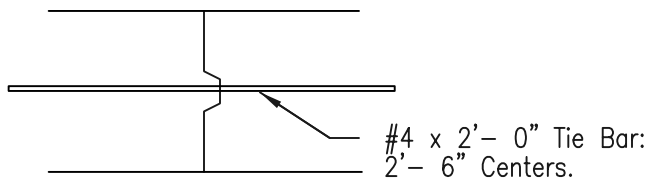
TRANSVERSE JOINT NEW PAVEMENT

Spacing of Transverse Joint As Shown On Project Drawings; 15' If Not Shown.



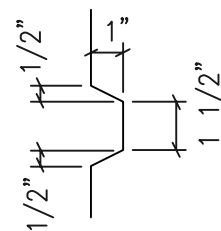
CONTROL JOINT DIMENSIONS

Note: Joints In Sidewalks Or Driveways Me Be Tooled As An Alternate To Saw Cutting. Tooled Joints Do Not Require Sealant.



TIED LONGITUDINAL CONSTRUCTION JOINT

Place Longitudinal Joint Where Shown On The Project Drawing; At Lane Lines If Not Shown.



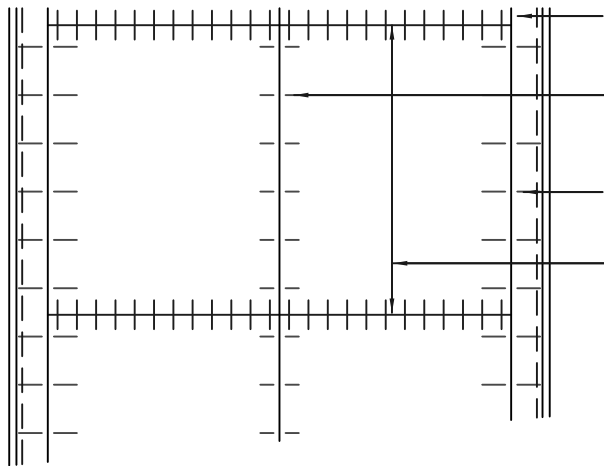
KEY SHAPE

CONCRETE PAVEMENT JOINT DETAILS

PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION

UNIFIED GOVERNMENT

UG 4100-A
2008 Edition



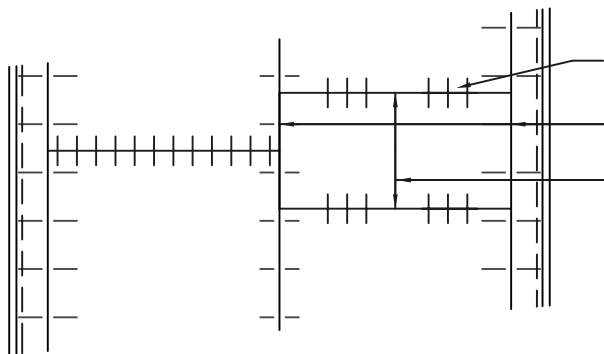
Dowels In Dowel Basket At Transverse Joints

Deformed Tiebars At Longitudinal Joint (Lane Line)

Deformed Tiebars At Curb Joint.

Space Joints To Eliminate Wire Mesh, 15' Typical, Or As Shown On The Project Drawings.

NEW CONSTRUCTION

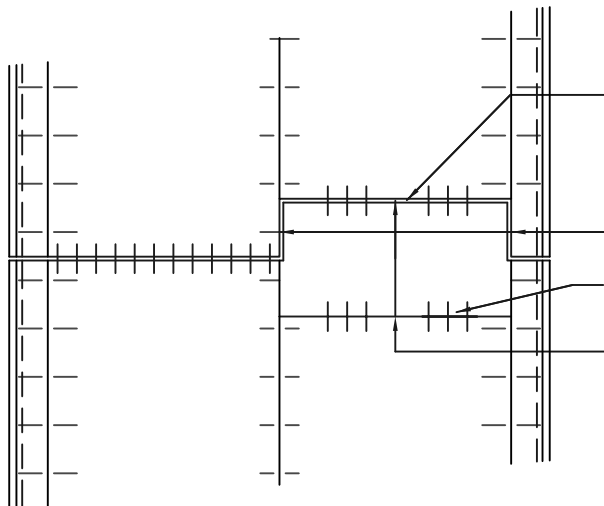


3 @ 1-1/8 " x 18" Dowels In Each Wheel Track

Deformed Tiebars At Curb And Lane Line.

Length As Marked By Engineer, 6' Minimum.

TRANSVERSE CONTROL JOINT REPAIR



Install Joint Filler On Transverse and Longitudinal Joints On One Side Of Patch To Make Continuous Working Joint.
Dowel Caps Required On Expansion Joint.

Cut Tiebars. Do Not Reinstall.

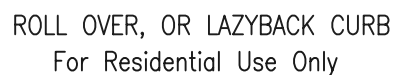
3 @ 1-1/8 " x 18" Dowels In Each Wheel Track

Length As Marked By Engineer, 6' Minimum.

TRANSVERSE EXPANSION JOINT REPAIR

CONCRETE PAVEMENT JOINT LAYOUT AND PATCHING
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT

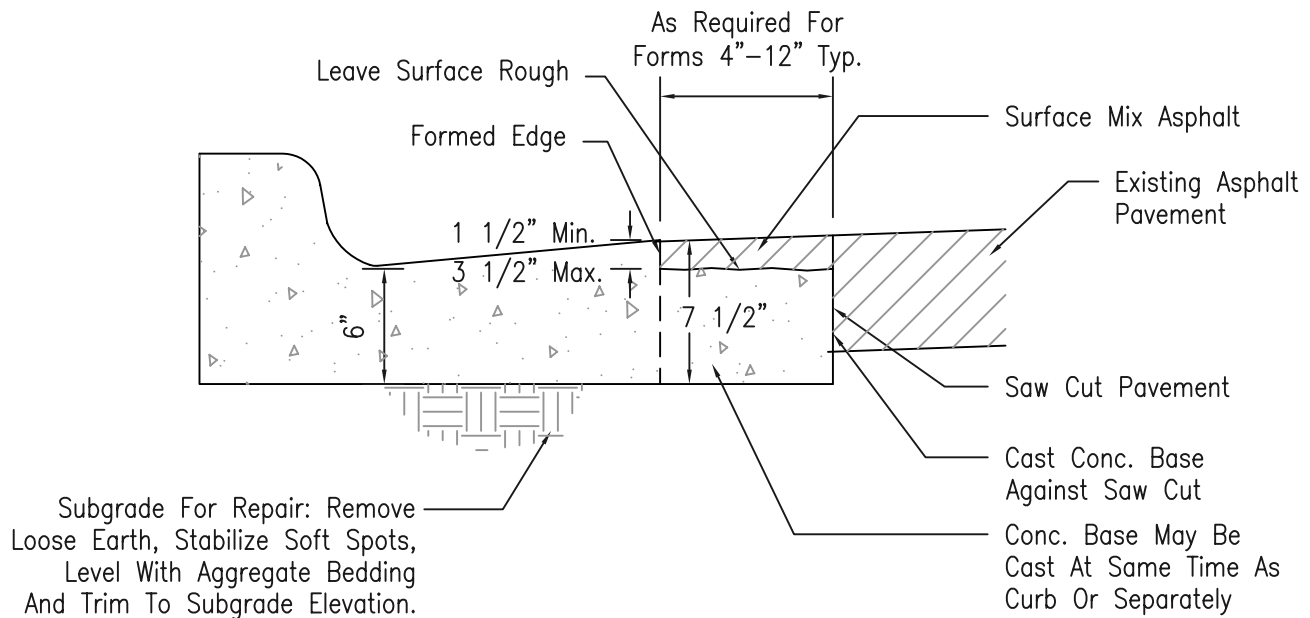
UG 4100-B
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Broom Finish Shall Be Used For All
Curb & Gutter.

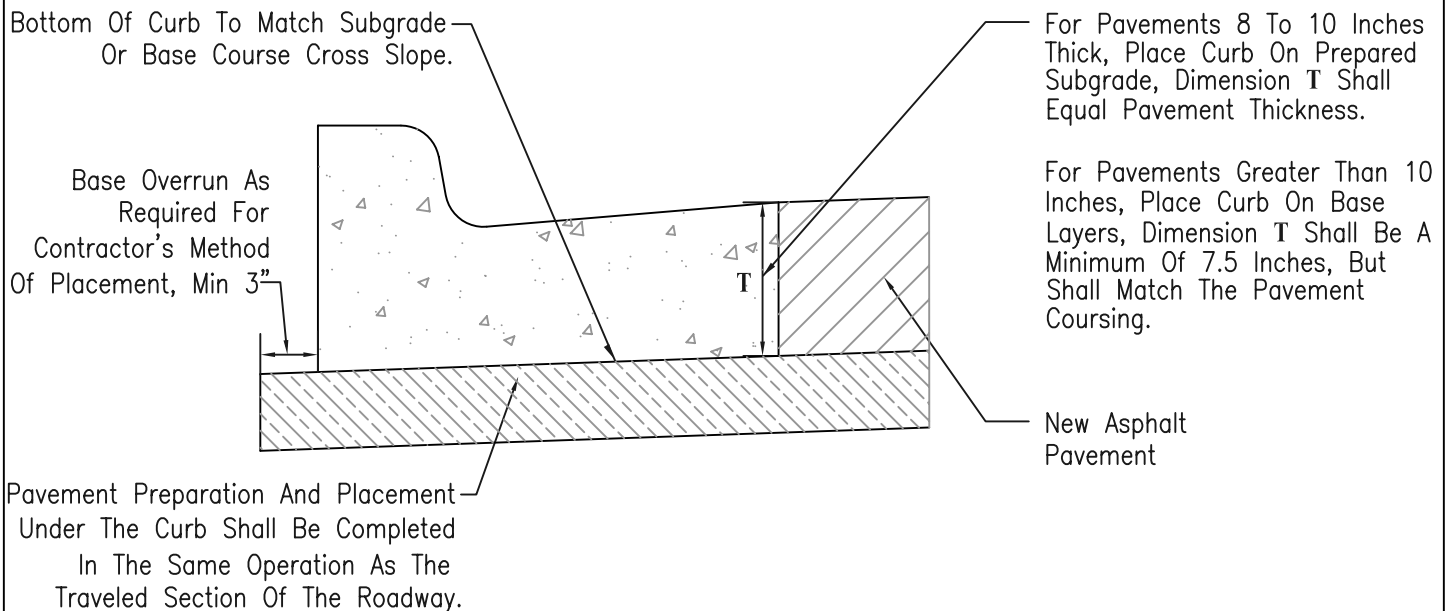


UG 4100-C
2008 Edition



CURB REPAIR

(Where Adjacent Pavement Is To Remain In Place)



CURB FOR NEW PAVEMENT

(For New Mainline Pavement & Repairs Where Adjacent Pavement Is Replaced)

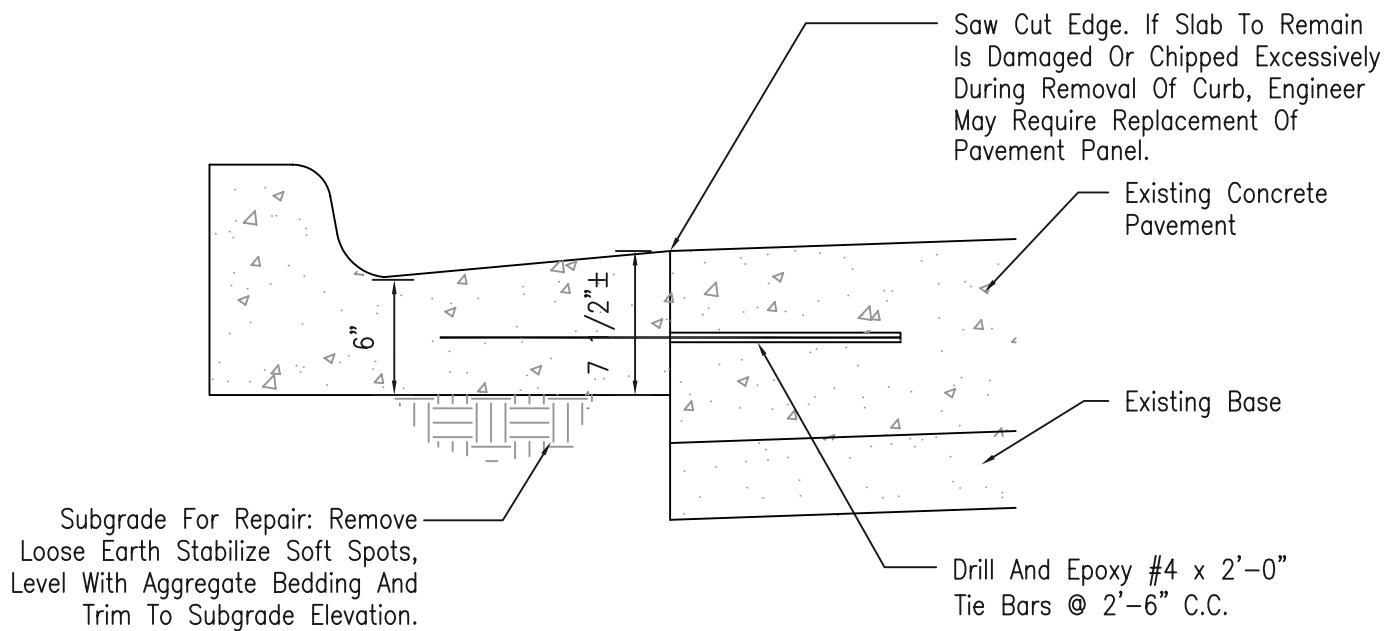
NOTES: Installation Details Shown on This Sheet for Standard Curb Apply to All Typical Curb Sections.

CURB AND GUTTER INSTALLATION (ASPHALT STREETS)

PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION

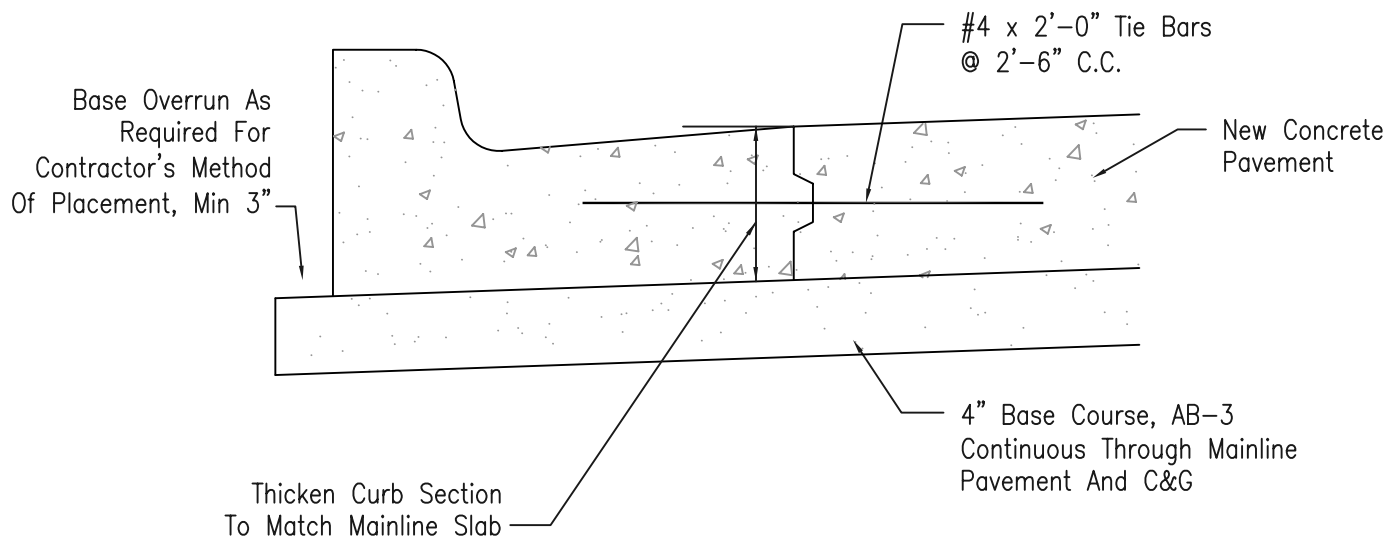
UNIFIED GOVERNMENT

UG 4100-D
2008 Edition



CURB REPAIR

(Where Adjacent Pavement Is To Remain In Place)



CURB FOR NEW CONCRETE PAVEMENT

(For New Mainline Pavement & Repairs Adjacent To Pavement Slabs Should Be Replaced)

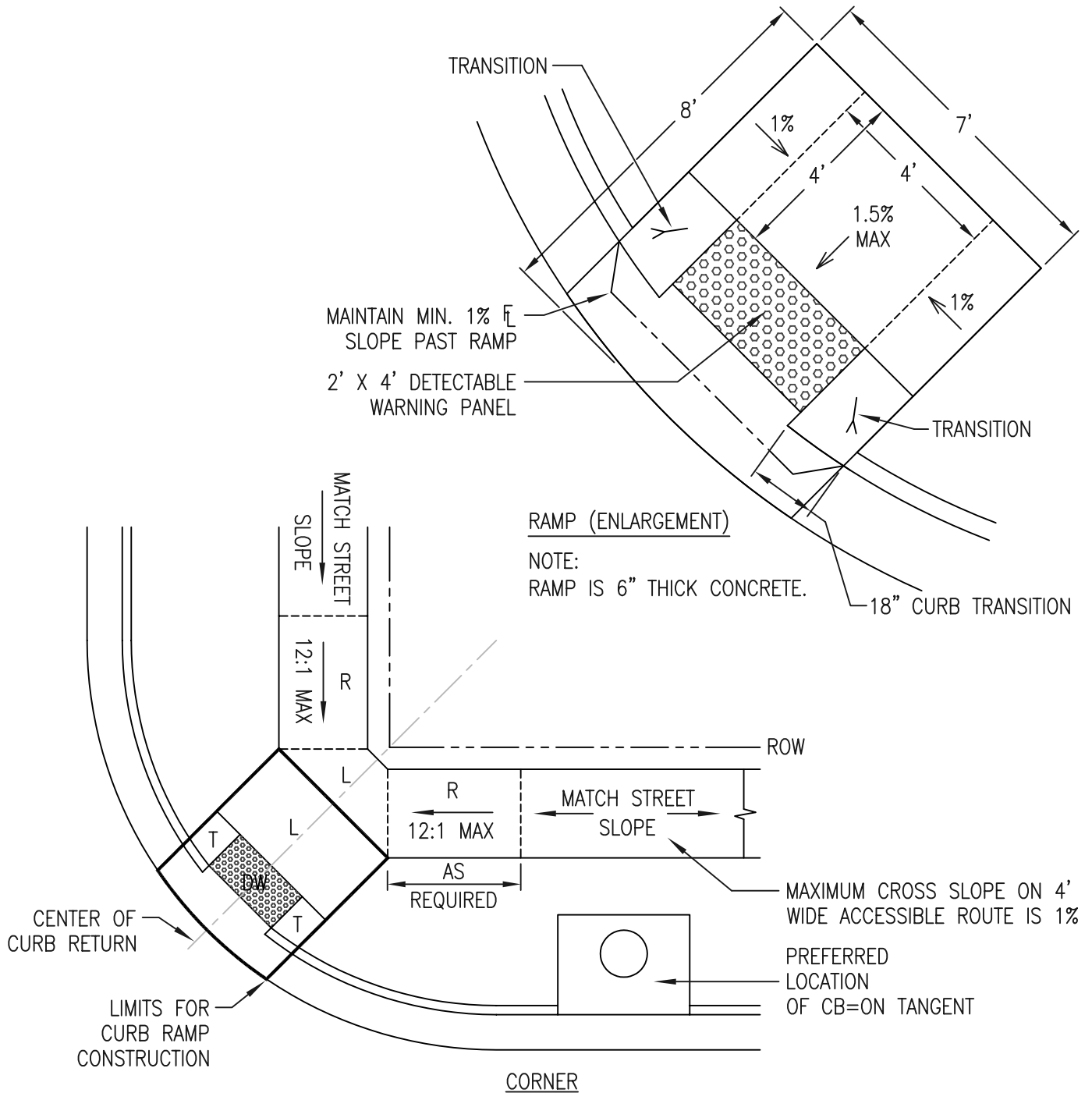
NOTES: Installation Details Shown on This Sheet for Standard Curb Apply to All Typical Curb Sections.

CURB AND GUTTER INSTALLATION (CONCRETE STREETS)

PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION

UNIFIED GOVERNMENT

UG 4100-E
2008 Edition



LEGEND:

- L: LANDING: SLOPE 1% TOWARD FLOWLINE & 0 TO 2% ACROSS WIDTH OF LANDING.
- R: RAMP: MAXIMUM 8.3% SLOPE IN DIRECTION OF TRAVEL, CROSS SLOPE 0 TO 2%.
- T: TRANSITION: MAXIMUM 10% SLOPE IN ANY DIRECTION, WHEN ADJACENT TO APPROACH WALK.
- DW: DETECTABLE WARNING PANELS.

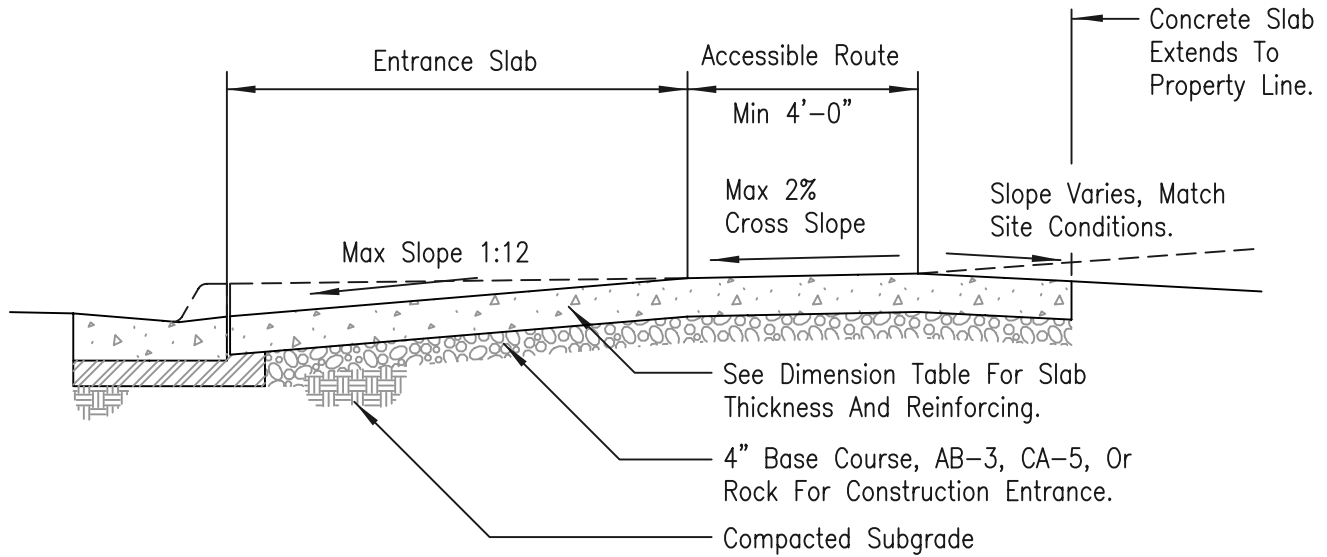
ADA RAMP FOR NEW CONSTRUCTION

PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION

UNIFIED GOVERNMENT

UG 4100-F
2008 Edition

Location Of Accessible Route
Varies. See Driveway Layout Detail



DRIVEWAY SECTION

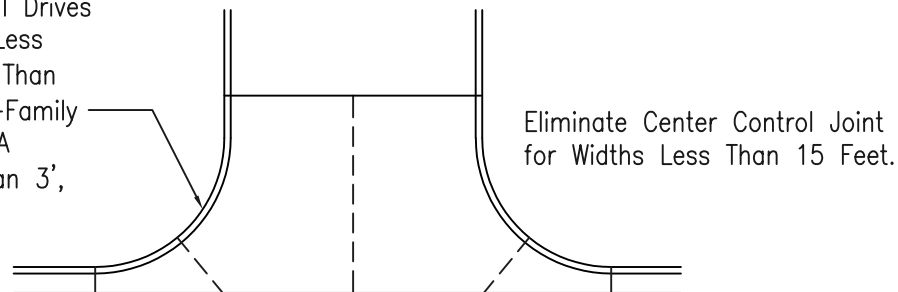
Type	Max. Width	Min. Slab Thickness	Min. Reinforcing
Residential *	25'	6"	None
Commercial	30'	8"	None
Industrial Δ	35'	8"	#4 @ 12" CC At Midspan On Chairs

*For Rural Section Roads (No C&G) Residential Driveways May Be 6" Asphalt On Compacted Subgrade.

Δ May Be Larger Than 35' If Approved By The County Engineer.

DIMENSION TABLE

Commercial & Industrial Drives May Have Radius Not Less Than 15', Nor Greater Than 25'. Single and Multi-Family Residential Shall Have A Transition Not Less Than 3', Nor Greater Than 5'.



CONTROL JOINT LOCATIONS

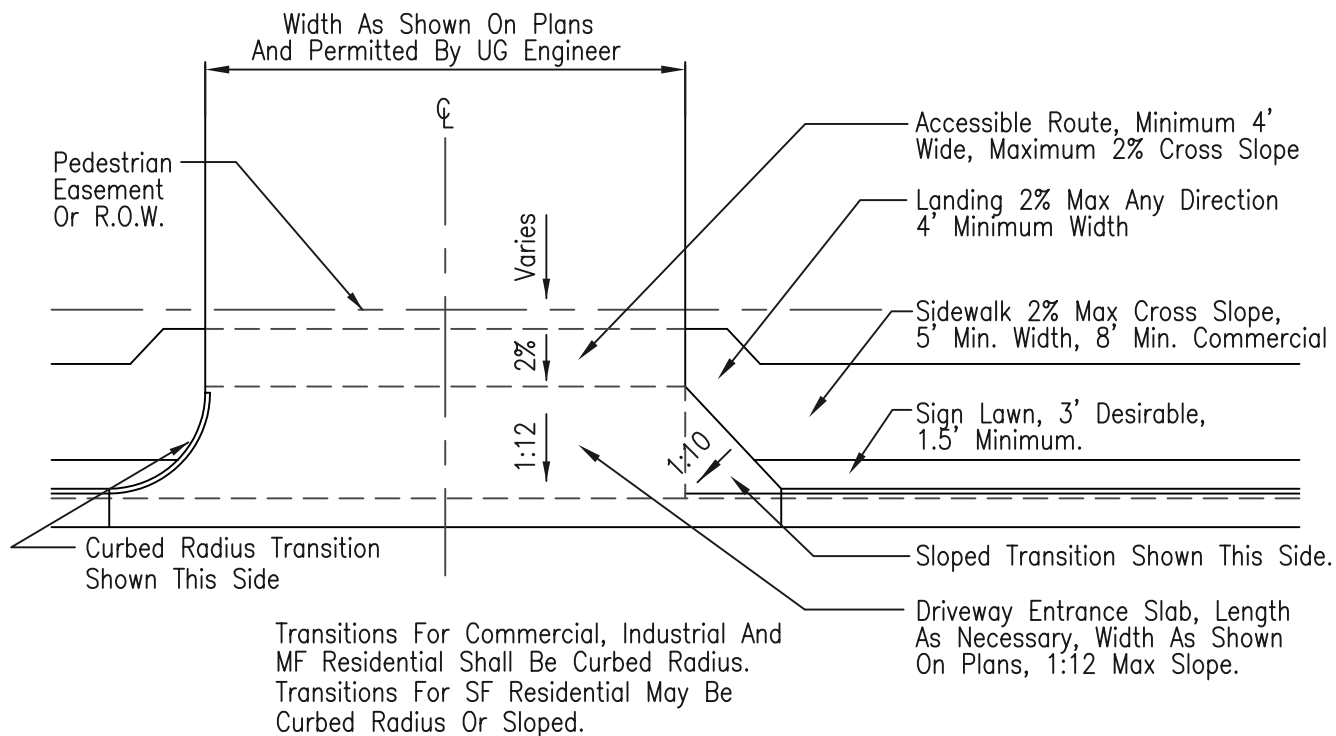
DRIVEWAY LAYOUT, SHEET 1 OF 2

GENERAL

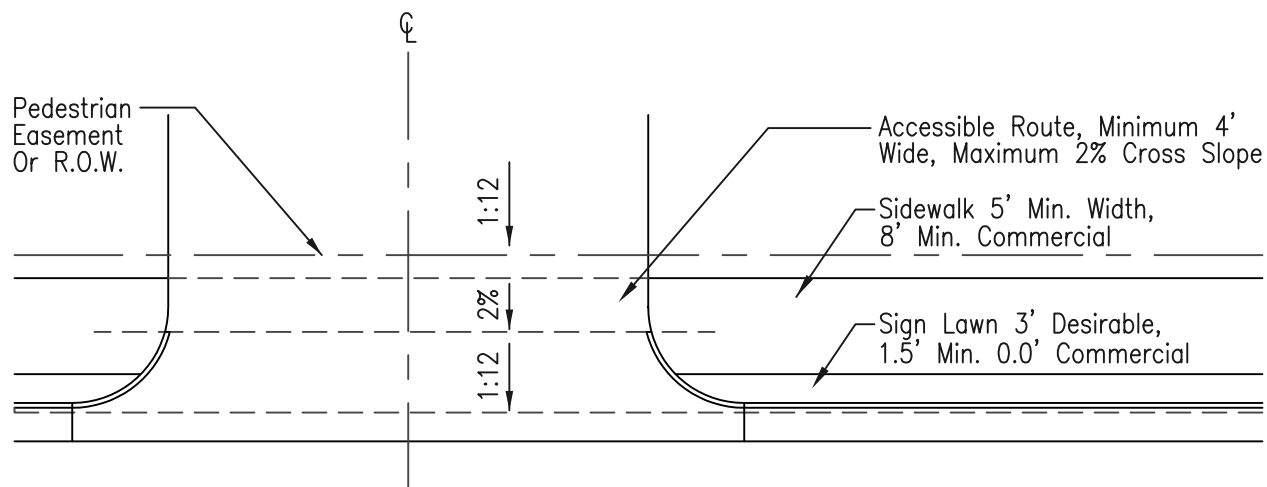
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION

UNIFIED GOVERNMENT

UG 4100-G
2008 Edition



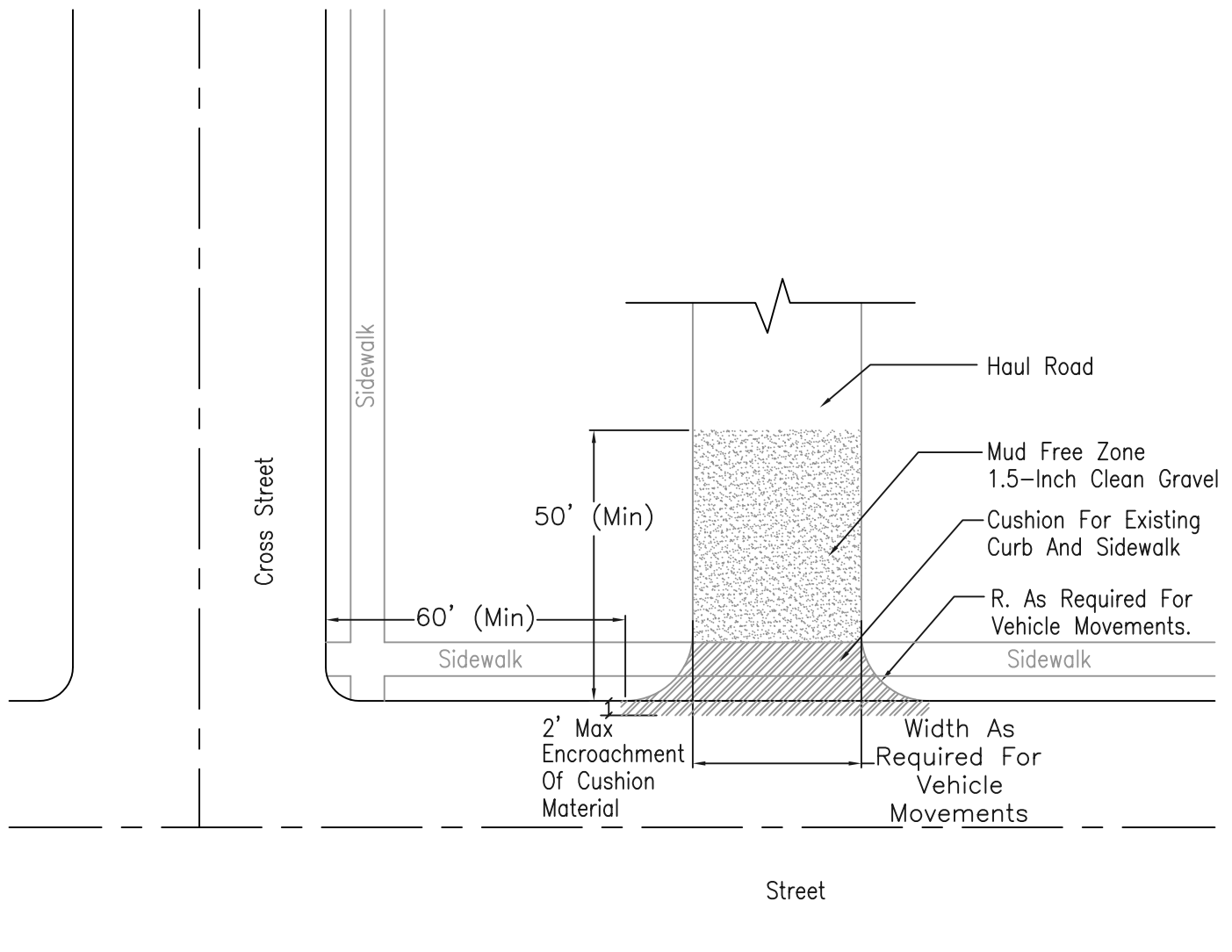
ACCESSIBLE ROUTE AT TOP OF DRIVEWAY



Where Pedestrian Easement Does Not Allow Accessible Route
At Top Of Entrance Slab, Accessible Route Shall Lay Between
Sloped Portions Of The Entrance Slab.

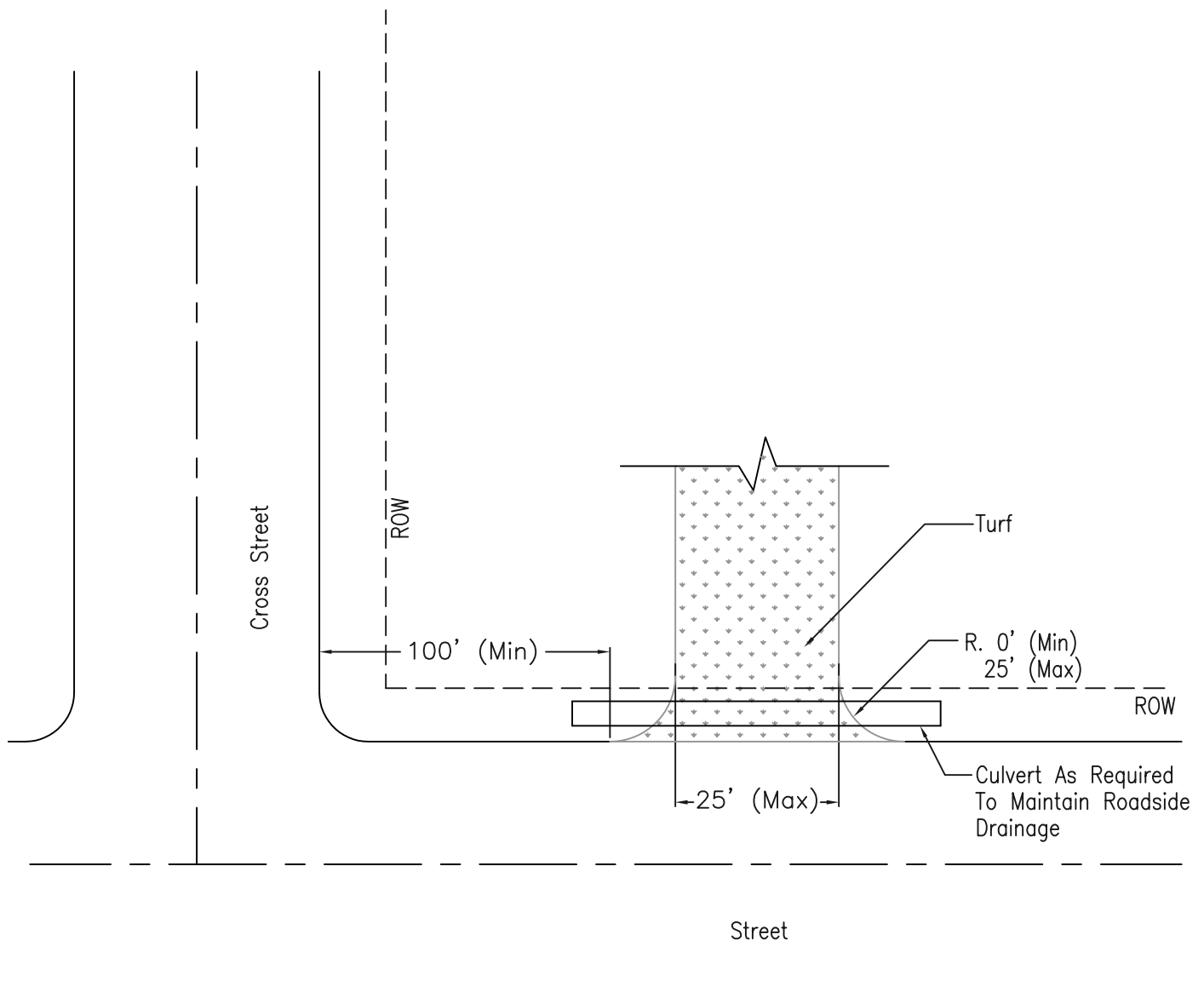
ACCESSIBLE ROUTE ALIGNED WITH SIDEWALK

DRIVEWAY LAYOUT, SHEET 2 OF 2 **FOR ADA ACCESSIBILITY** **PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION** **UNIFIED GOVERNMENT**



DRIVEWAY DIMENSIONS & MATERIALS, SHEET 1 OF 6
CONSTRUCTION ENTRANCE
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT

UG 4100-I
 2008 Edition



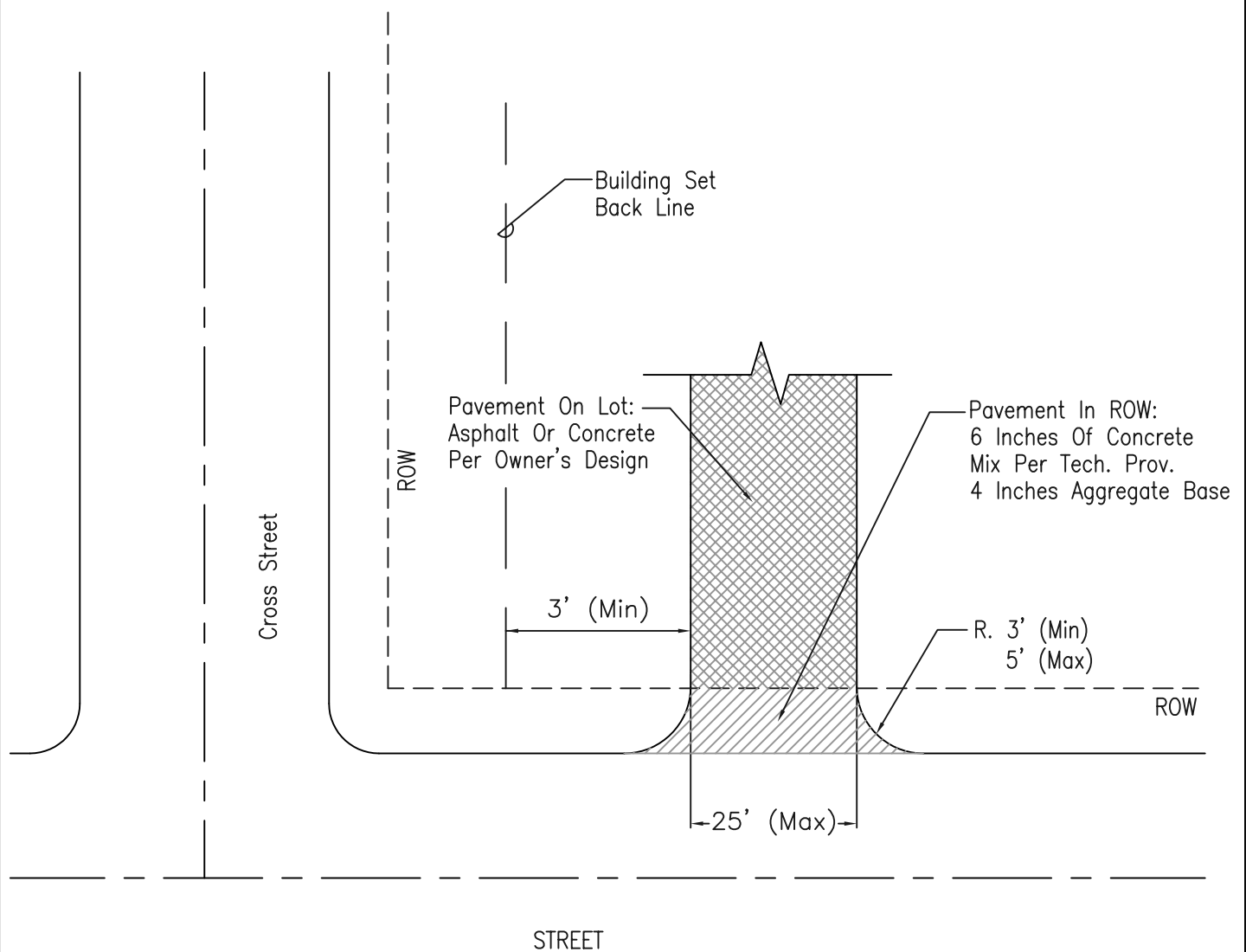
DRIVEWAY DIMENSIONS & MATERIALS, SHEET 2 OF 6

FIELD ENTRANCE

PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION

UNIFIED GOVERNMENT

UG 4100-J
2008 Edition

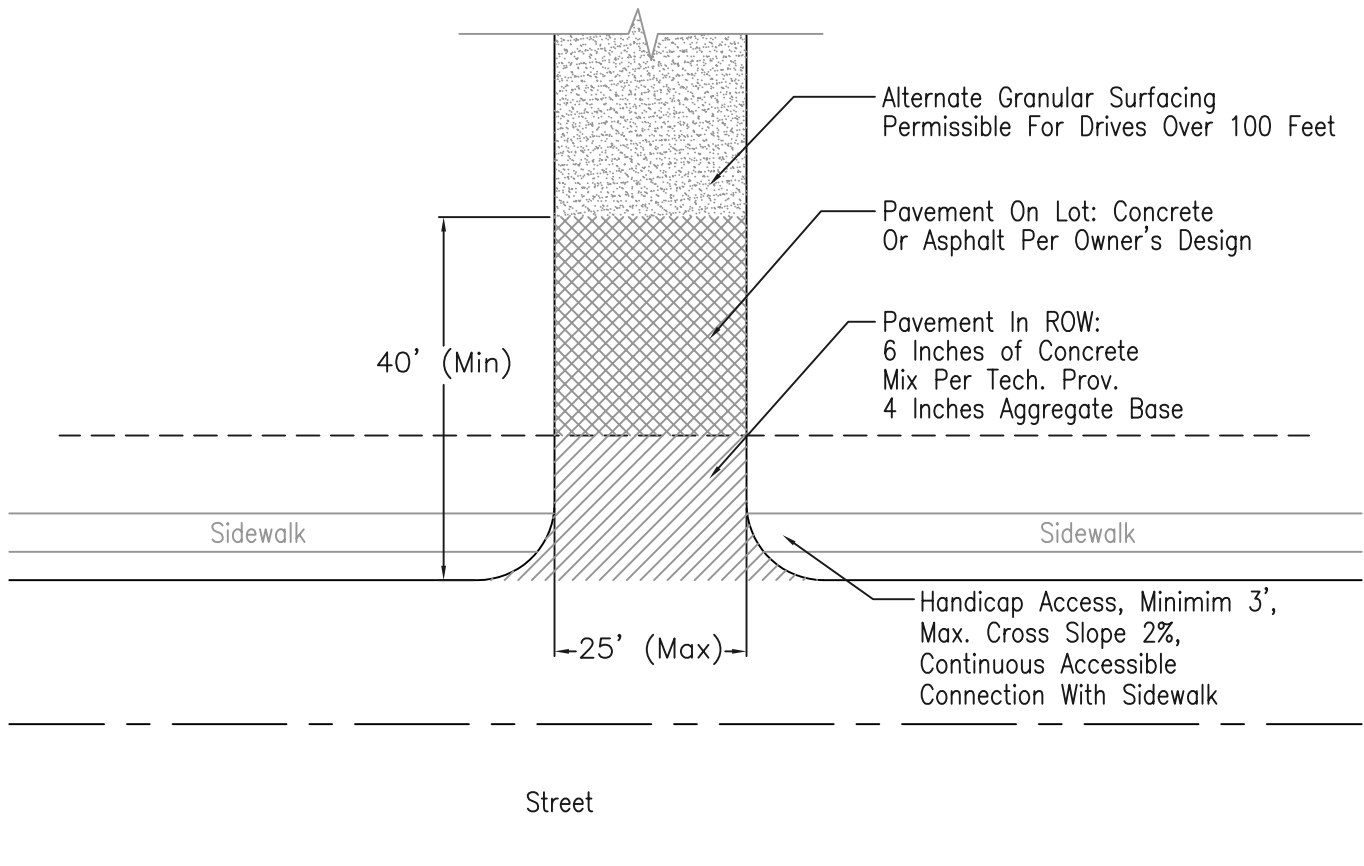


NOTE:

Applies To Single Family & Duplex Lots. Multifamily Entries Shall Conform To Commercial Driveway Standards.

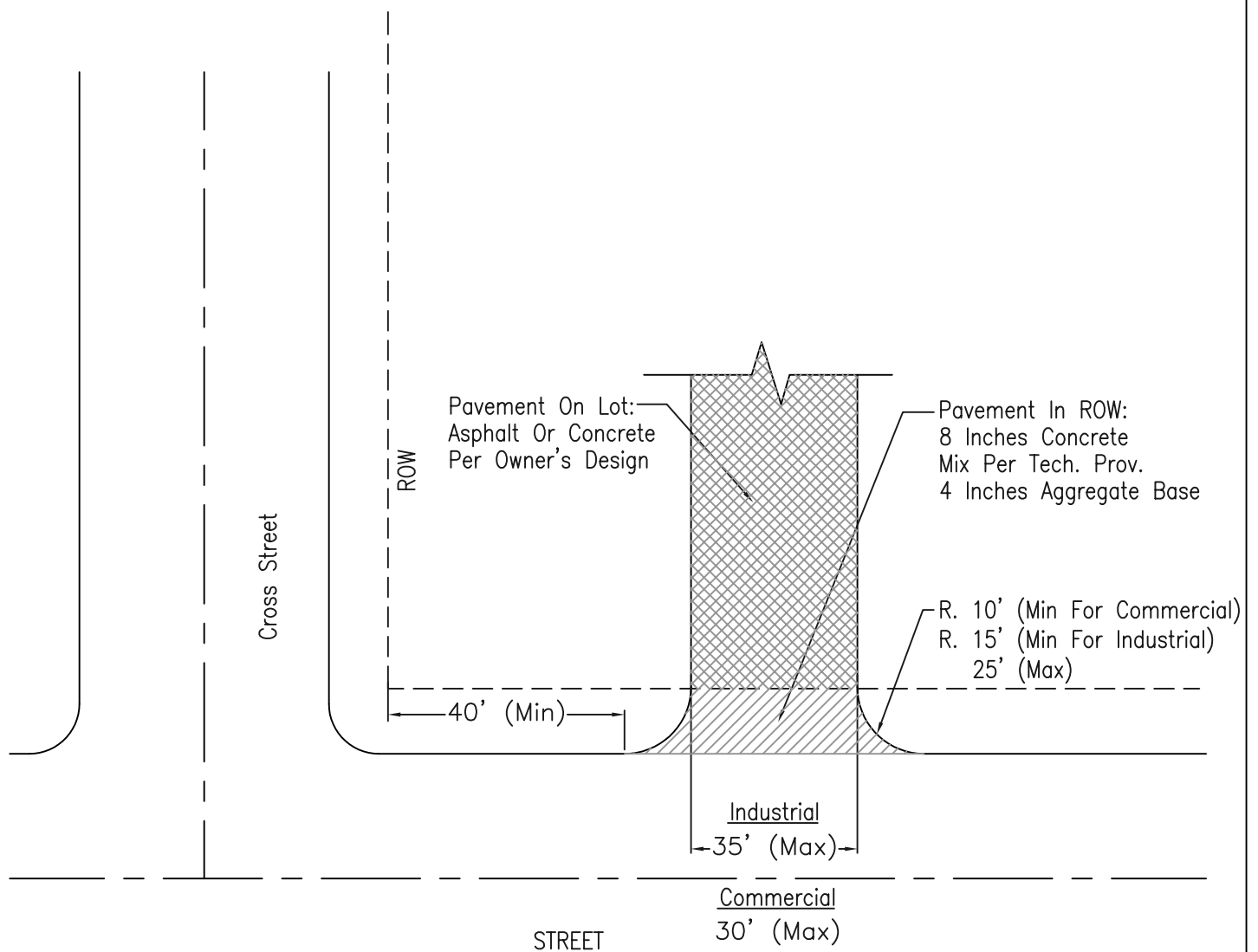
DRIVEWAY DIMENSIONS & MATERIALS, SHEET 3 OF 6
RESIDENTIAL
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT

UG 4100-K
2008 Edition



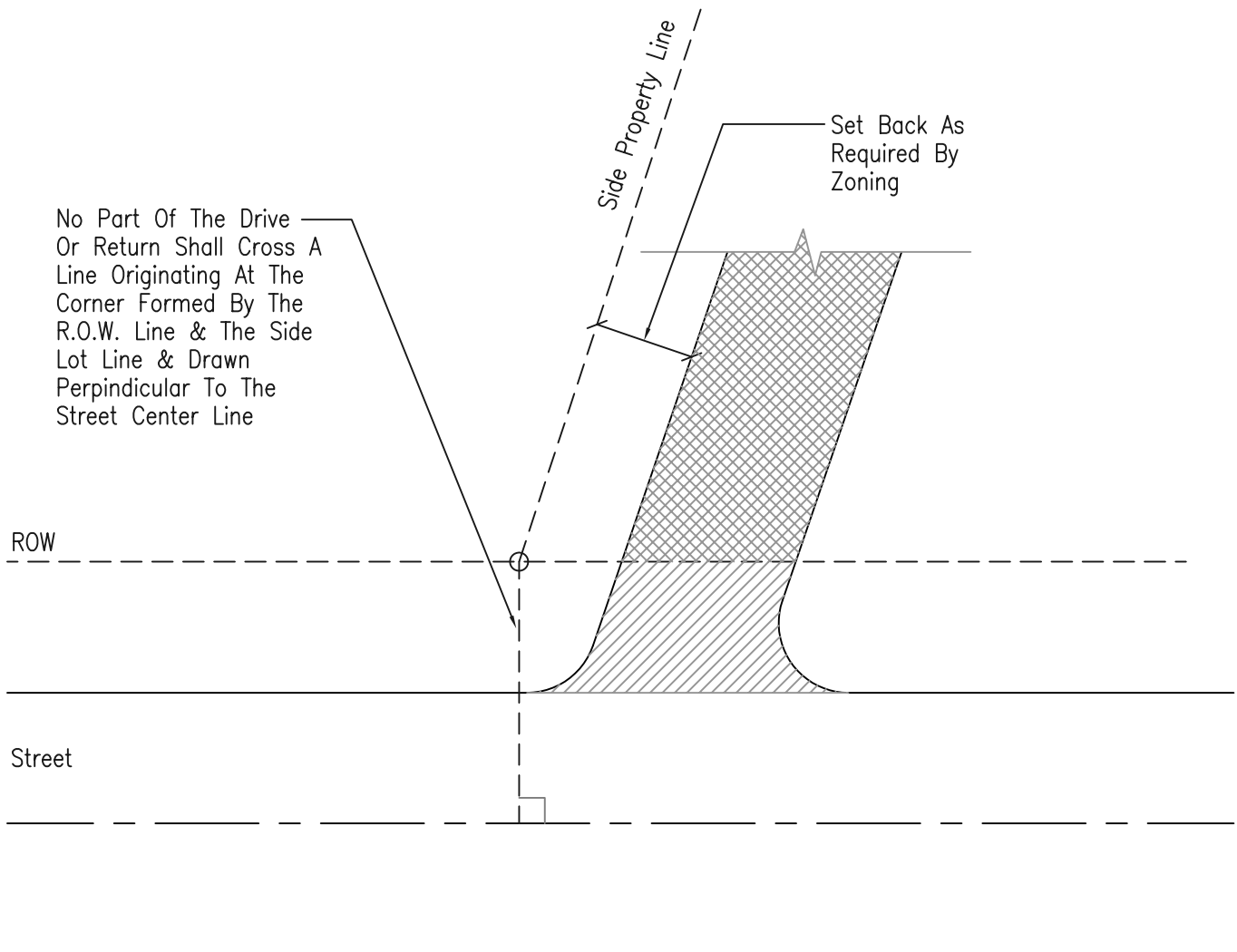
DRIVEWAY DIMENSIONS & MATERIALS, SHEET 4 OF 6
LONG DRIVEWAY ON RESIDENTIAL LOTS
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT

UG 4100-L
2008 Edition



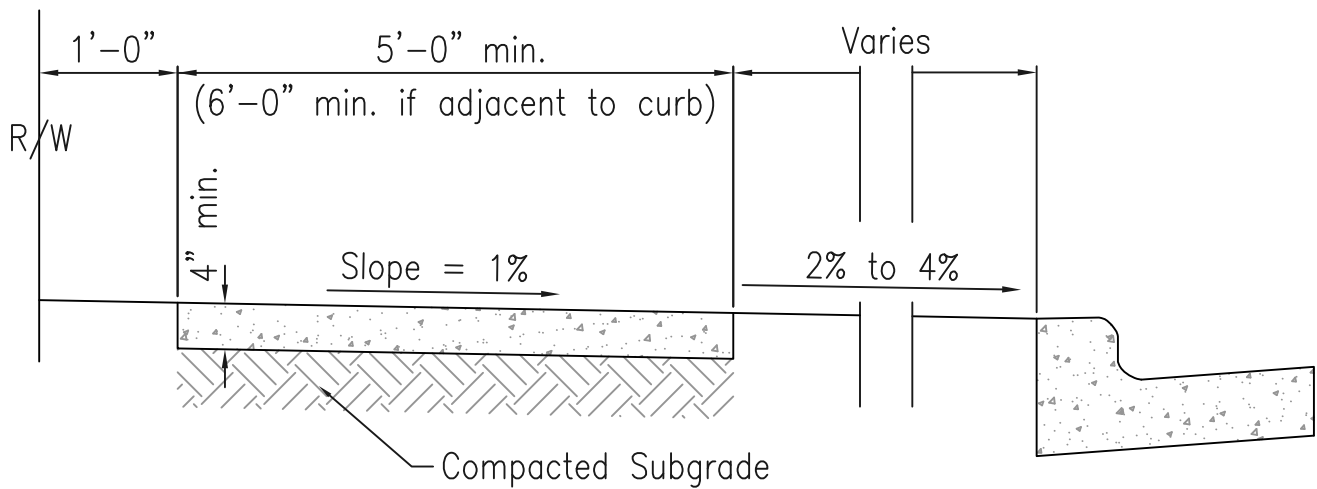
DRIVEWAY DIMENSIONS & MATERIALS, SHEET 5 OF 6
 COMMERCIAL / INDUSTRIAL DRIVEWAY
 PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
 UNIFIED GOVERNMENT

UG 4100-M
 2008 Edition



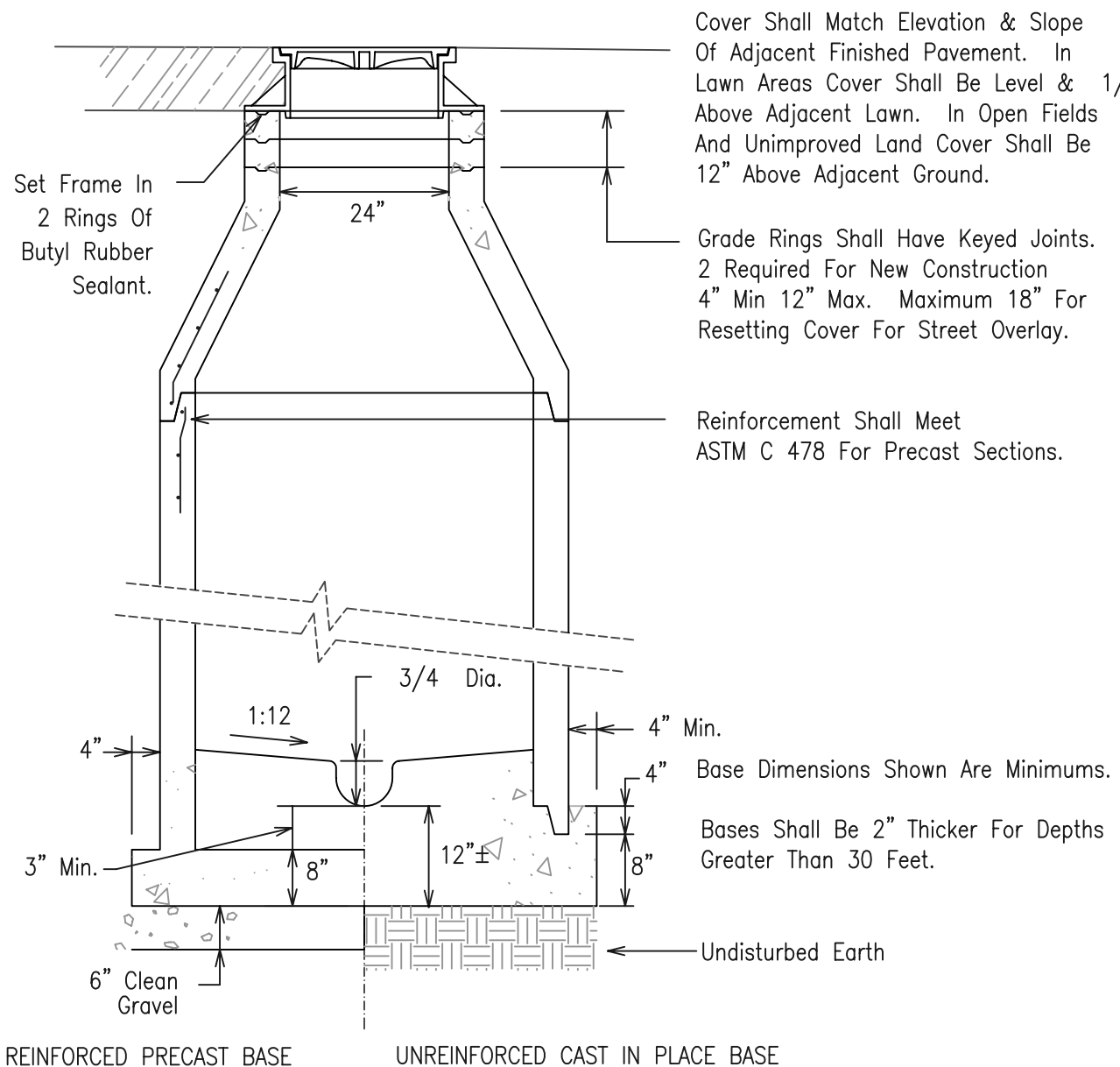
DRIVEWAY DIMENSIONS & MATERIALS, SHEET 6 OF 6
SIDE PROPERTY LINE SETBACK ALL DRIVEWAYS
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT

UG 4100-N
 2008 Edition



STANDARD SIDEWALK DETAIL
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT

UG 4100-0
 2008 Edition



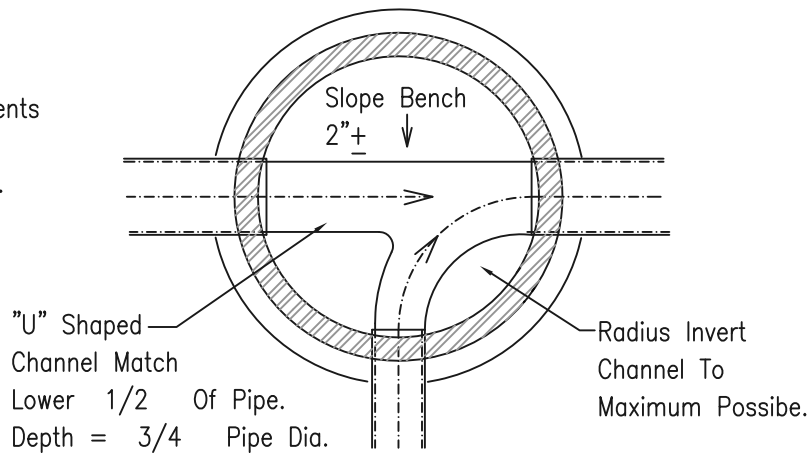
NOTES:

1. Risers, Cones & Grade Rings Shall Conform To ASTM C 478. Use Concentric Cones Unless Otherwise Directed.
2. All New Sanitary Manholes Shall Be Vacuum Tested.
3. Water Proofing Requirements: Apply Mastic Gasket Or Preformed Joint Material At Every Joint, Including Adjustment Rings. Two 6 Mil Coats Of External Damp Proofing Required. Apply Composite External Joint Waterproofing At Barrel and Adjustment Ring Joints. See Spec for Internal Damp Proofing Requirements. Grout Fill Lifting Holes.

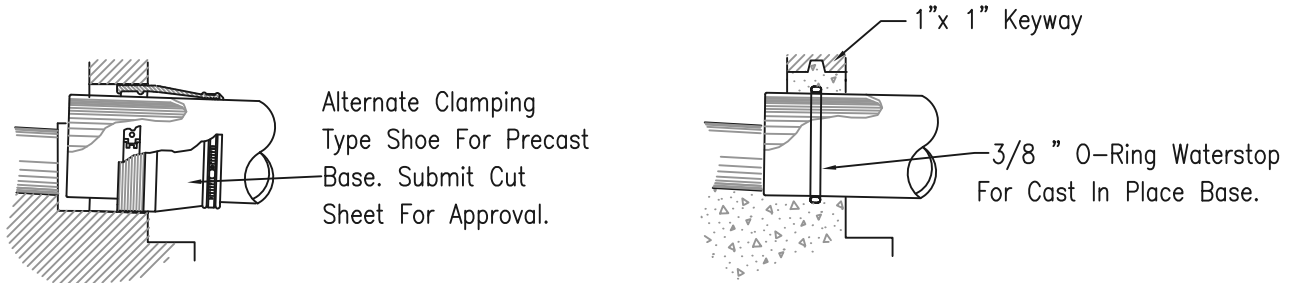
STANDARD MANHOLE DETAIL, SHEET 1 OF 3
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT

UG 5000-A
 2008 Edition

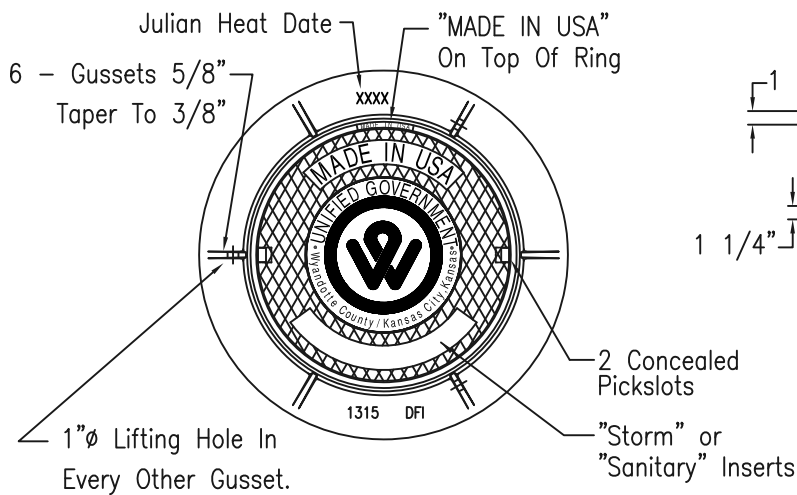
Invert Shaping Requirements
Apply To All Manholes,
Junction Boxes, & Inlets.



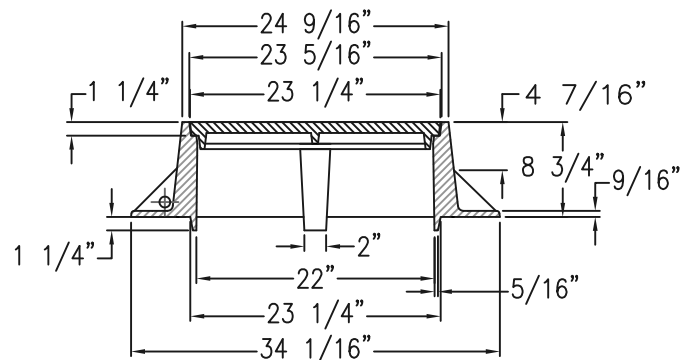
INVERT SHAPING



SANITARY SEWER PIPE JOINT WATERSTOP



STANDARD MANHOLE COVER (SANITARY)



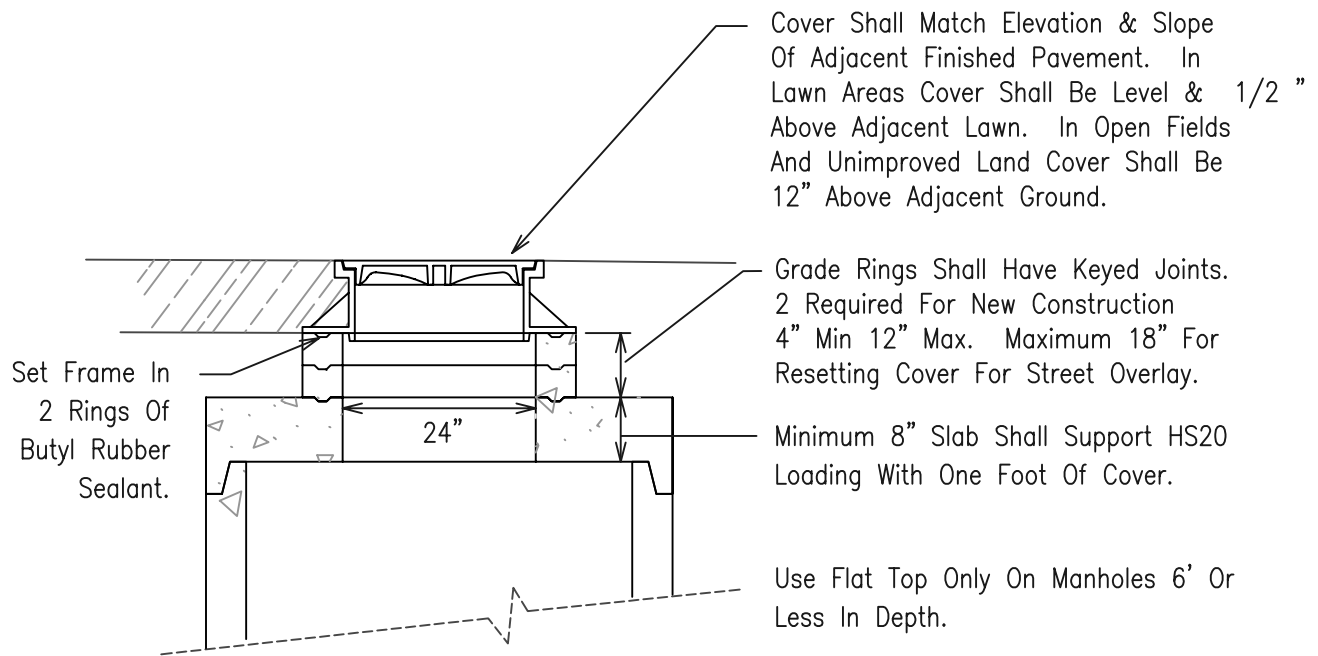
NOTE:

- Furnished With Machined Horizontal Bearing Surface.
- Material: Gray Cast Iron ASTM A-48, Class 35B.
- Weight: Frame 225 Lbs.
Cover 135 Lbs.
- Finish: No Paint

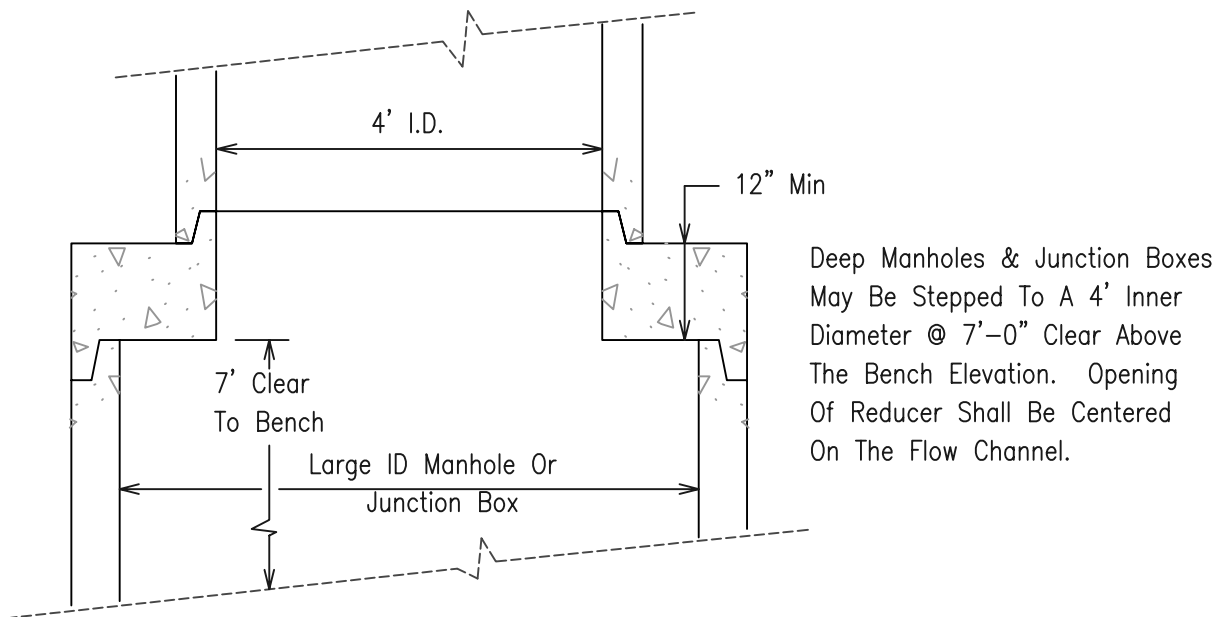
STANDARD MANHOLE DETAIL, SHEET 2 OF 3
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT

UG 5000-B
2008 Edition

Revised on 7/30/2012
23 $\frac{1}{8}$ " on the MH lid was changed to 23 $\frac{1}{4}$ "



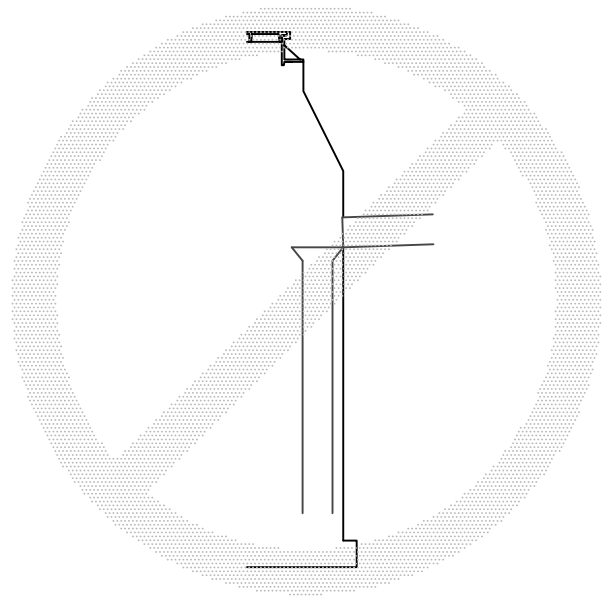
FLAT TOP MANHOLE, SHALLOW INSTALLATION



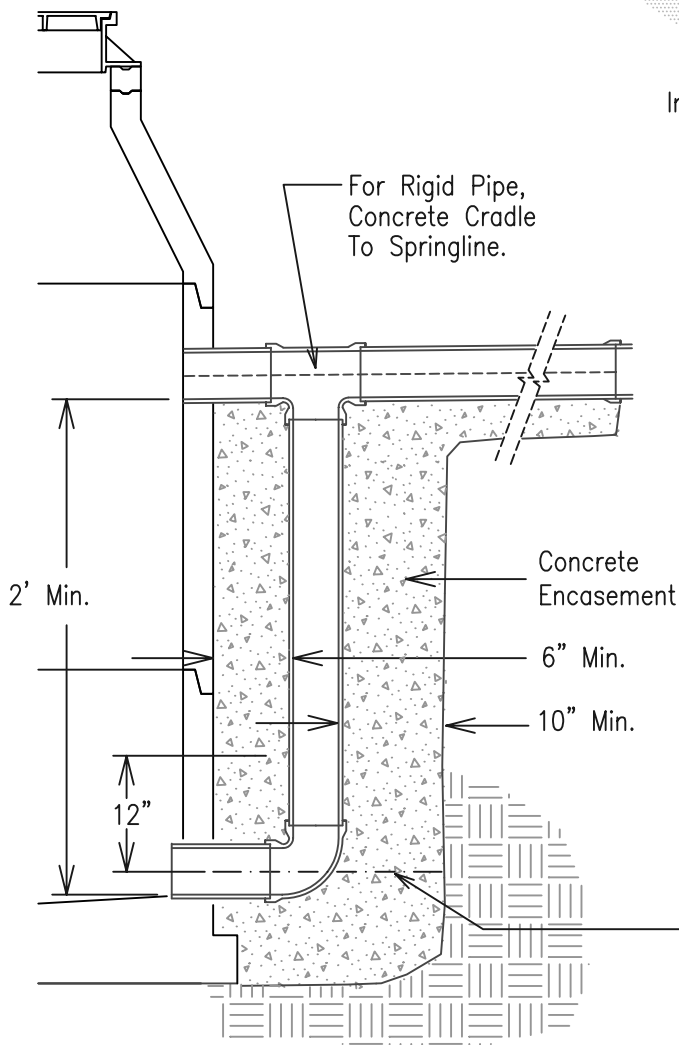
BARREL REDUCTION FOR DEEP MANHOLES

STANDARD MANHOLE DETAIL, SHEET 3 OF 3
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT

UG 5000-C
 2008 Edition



Inside Drops Are Not Allowed



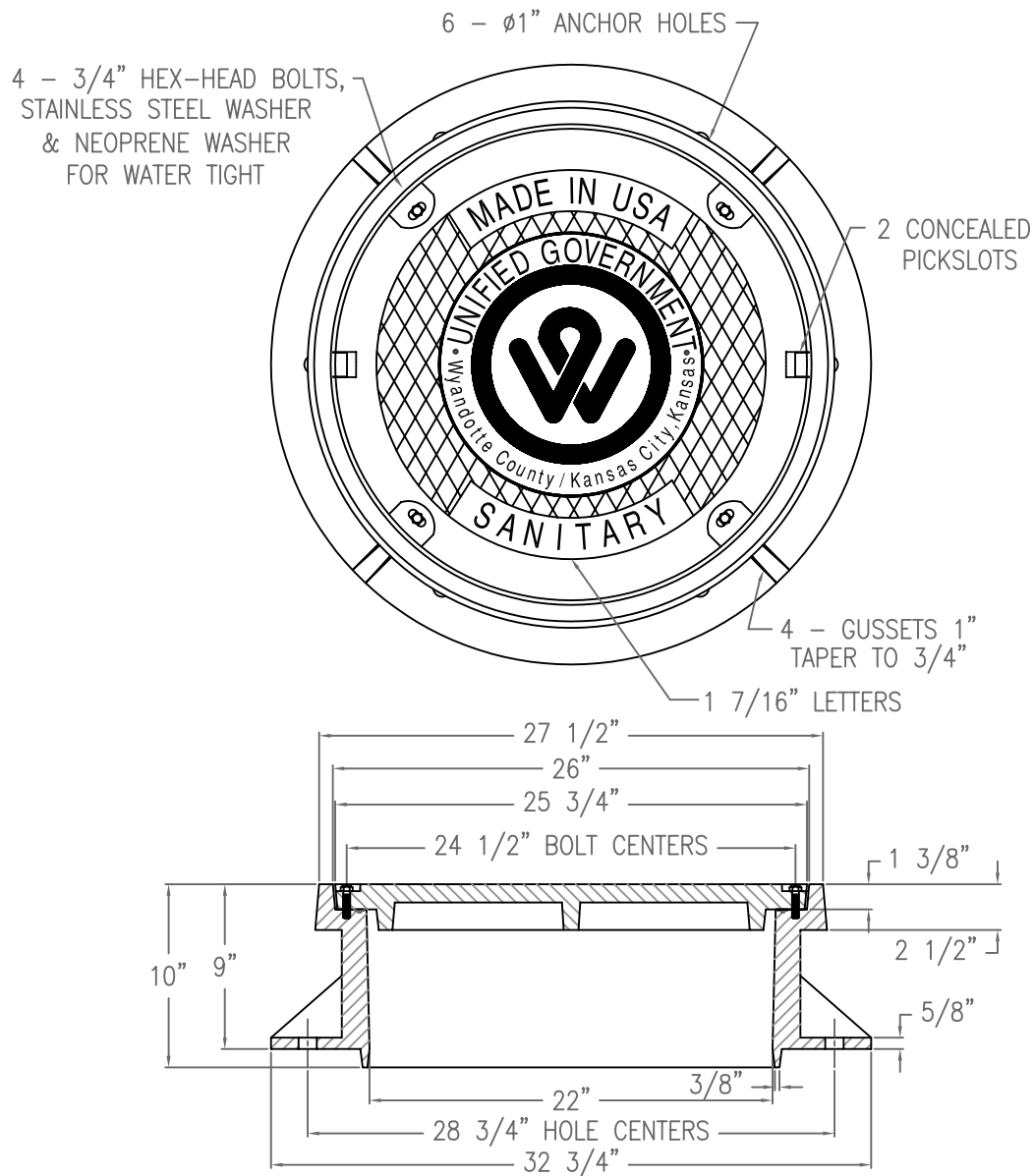
For Rigid Pipe,
Extend Cradle To 1st Joint
Past Point Where Trench
Reaches Allowable Width.

Drop Pipe Shall Be Same
Diameter & Material As Main.

Upper Limit for Encasement
for PVC Drop Pipe and Main
Remainder of Backfill Shall
Be Granular Material.

DROP MANHOLE DETAIL
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT

UG 5000-D
2008 Edition



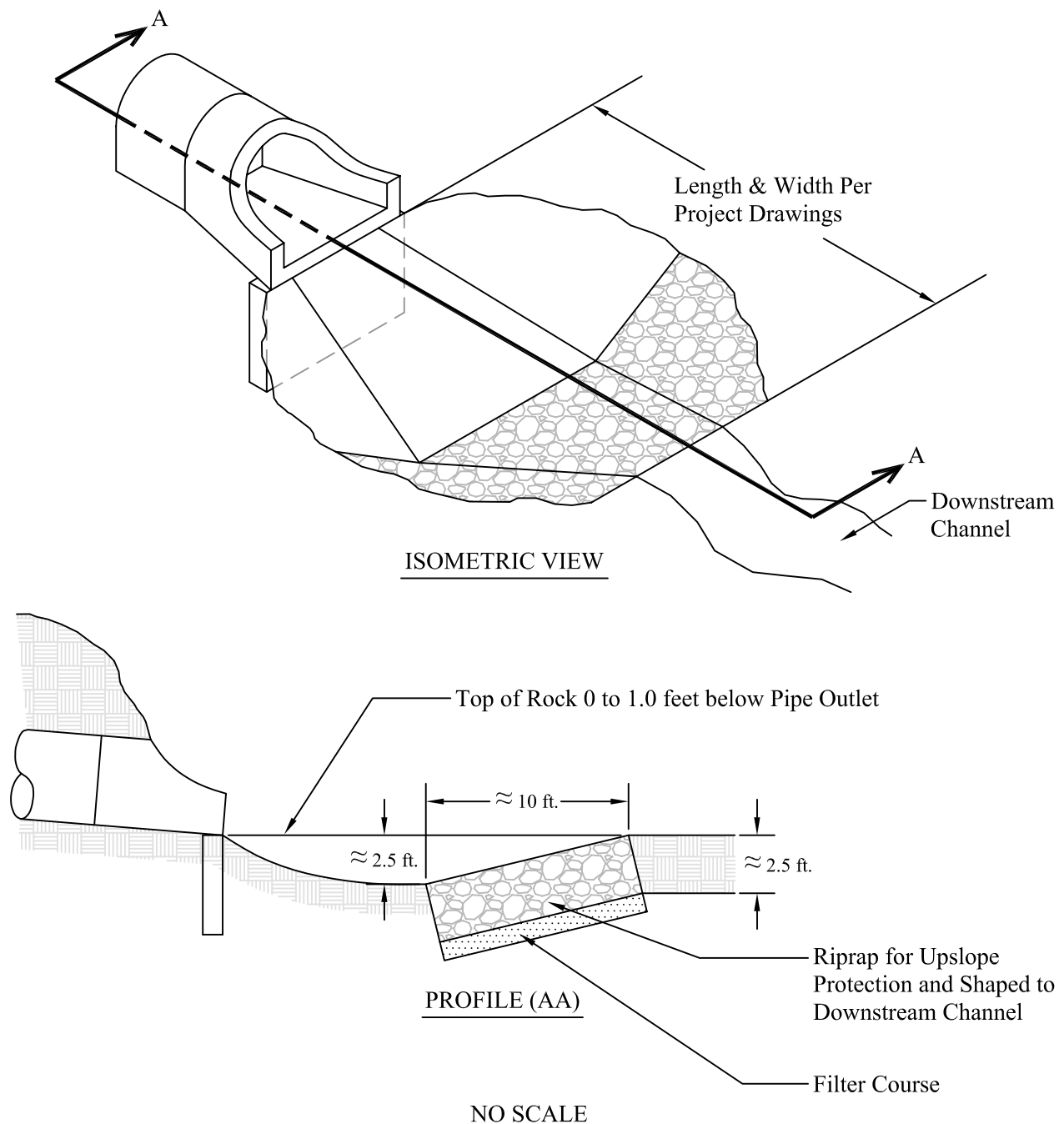
NOTES:

1. FURNISHED WITH MACHINED
HORIZONTAL BEARING SURFACE.
2. FURNISHED WITH T-GASKET.

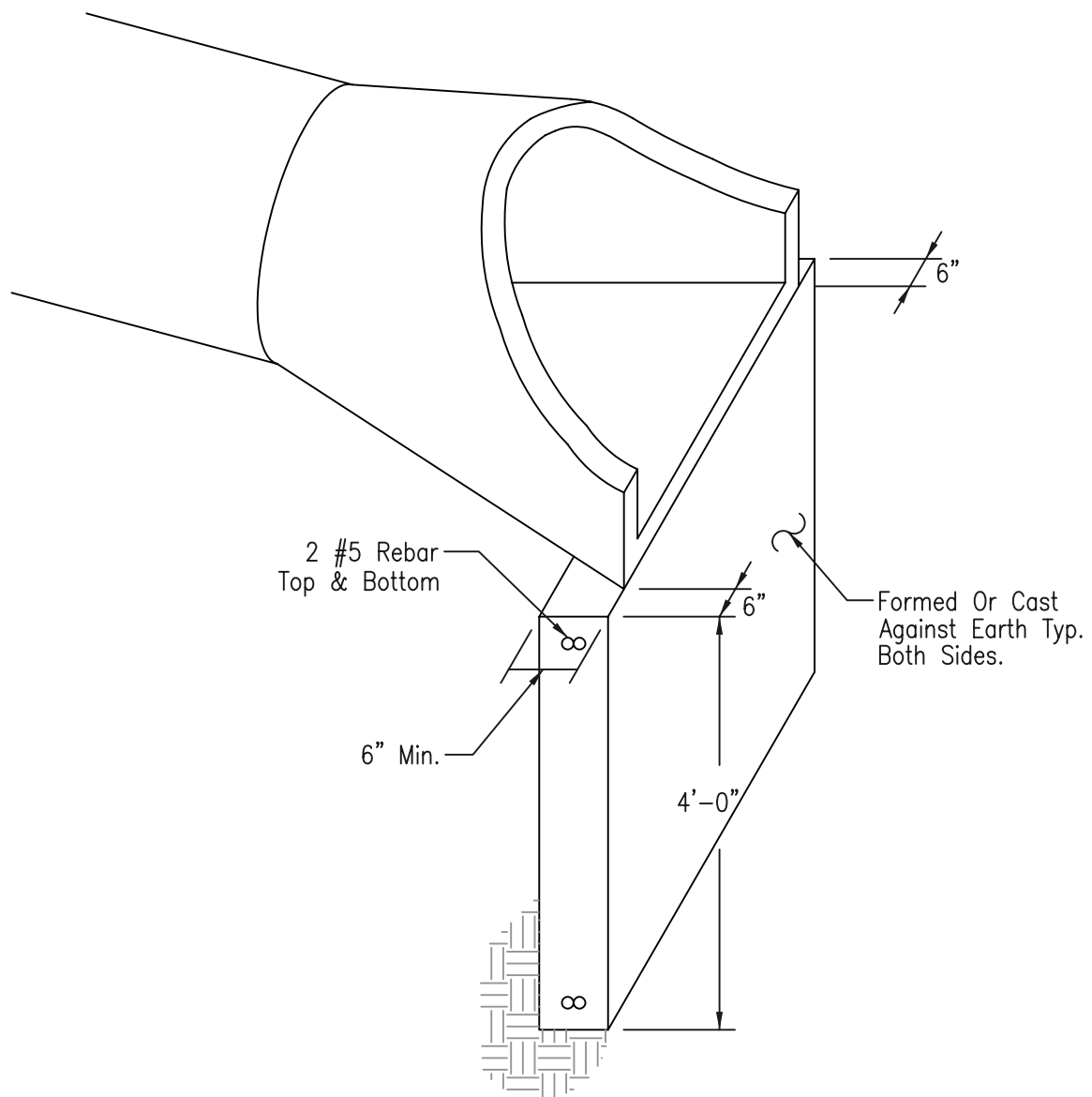
MATERIAL:	CAST GRAY IRON ASTM A-48, CLASS 35B
FINISH:	NO PAINT
WEIGHT:	FRAME 310 LBS. COVER 195 LBS.

BOLT-DOWN MANHOLE DETAIL
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT

UG 5000-E
2008 Edition

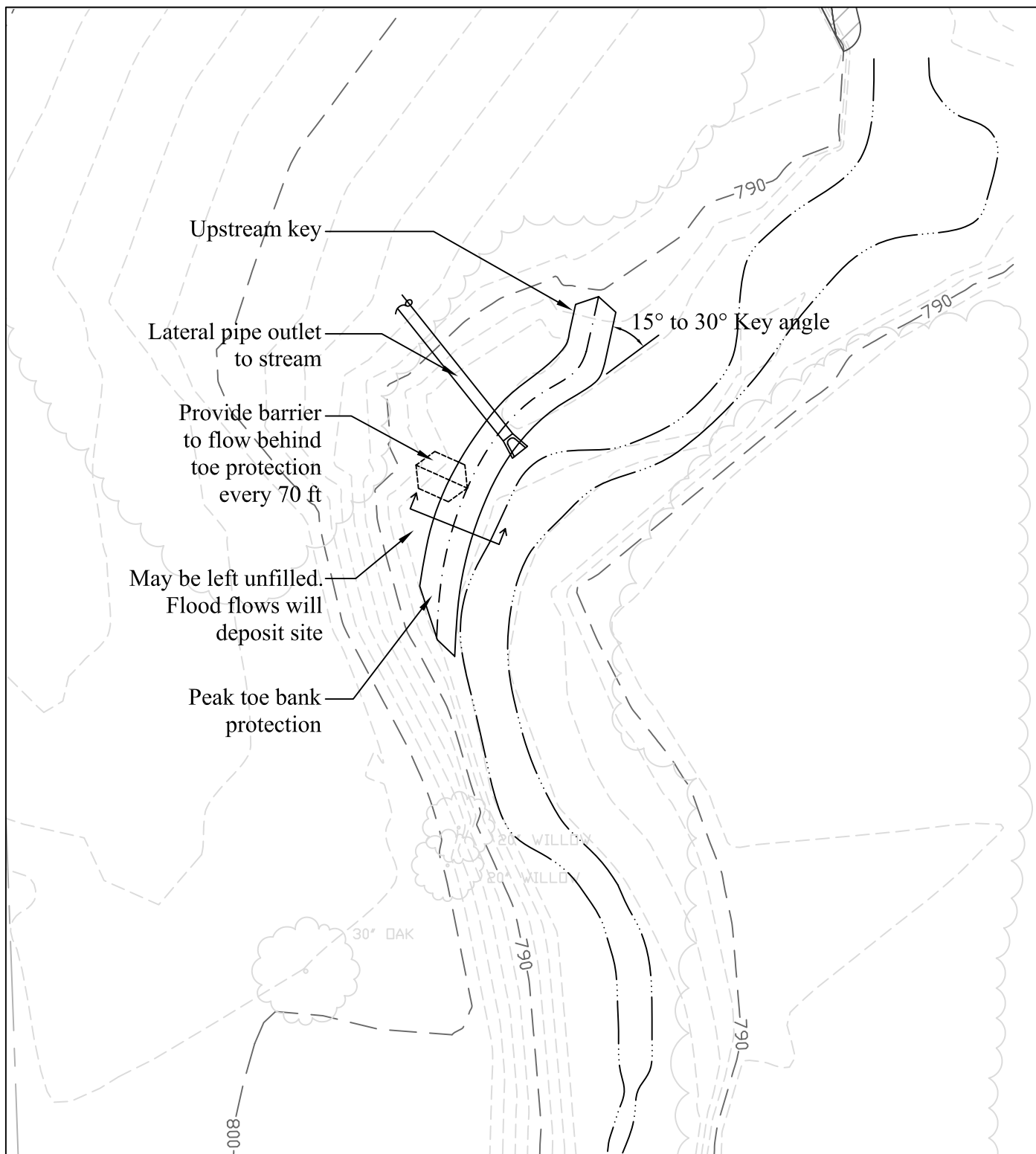


PLUNGE POOL FOR OUTLET IN LINE WITH STREAM
 PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
 UNIFIED GOVERNMENT



TOE WALL FOR FLARED END SECTION
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT

UG 5200-B
 2008 Edition

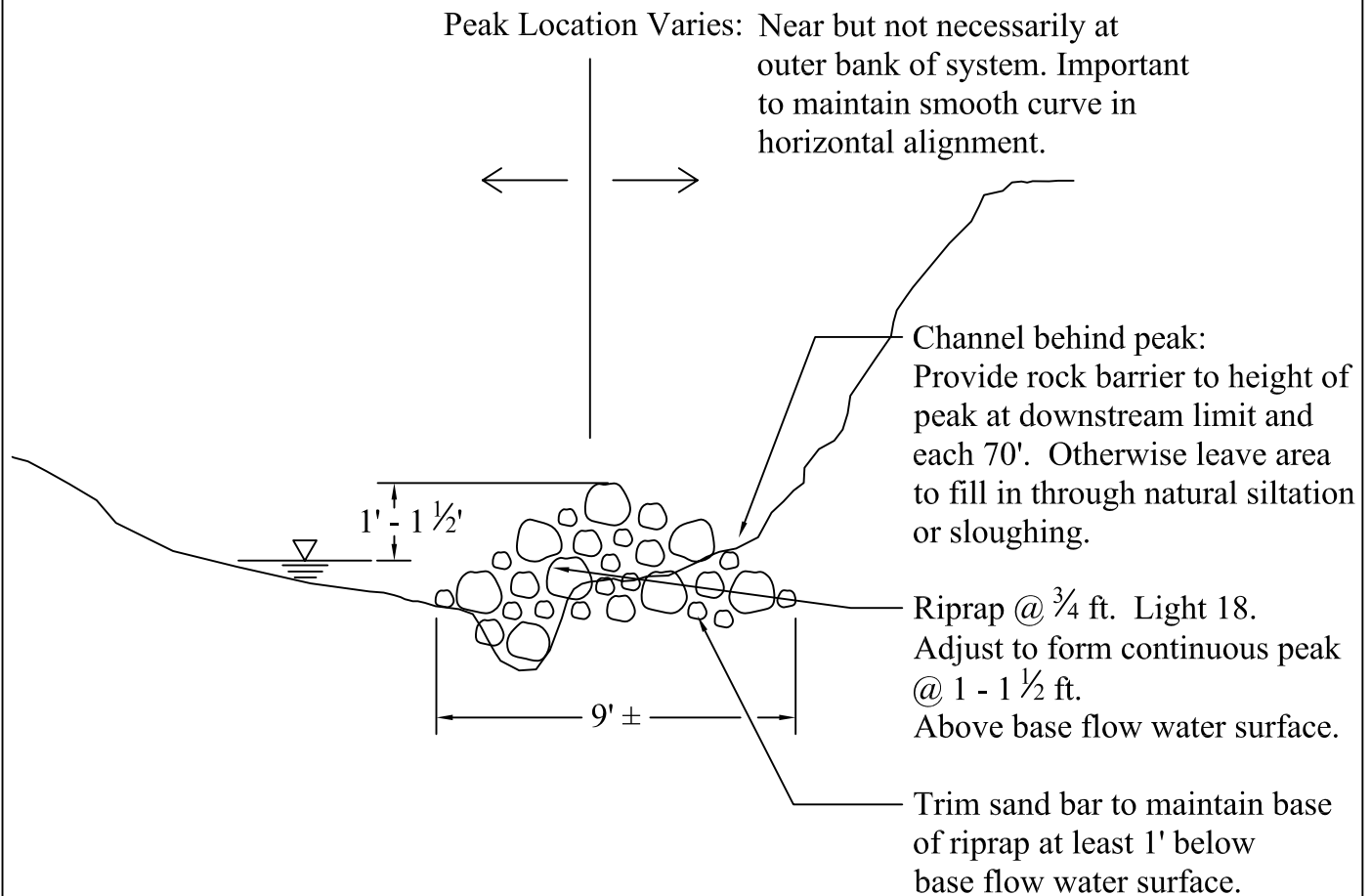


STORM SEWER OUTLET LATERAL TO STREAM, SHEET 1 OF 2
PLAN VIEW

PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION

UNIFIED GOVERNMENT

UG 5200-C
2008 Edition



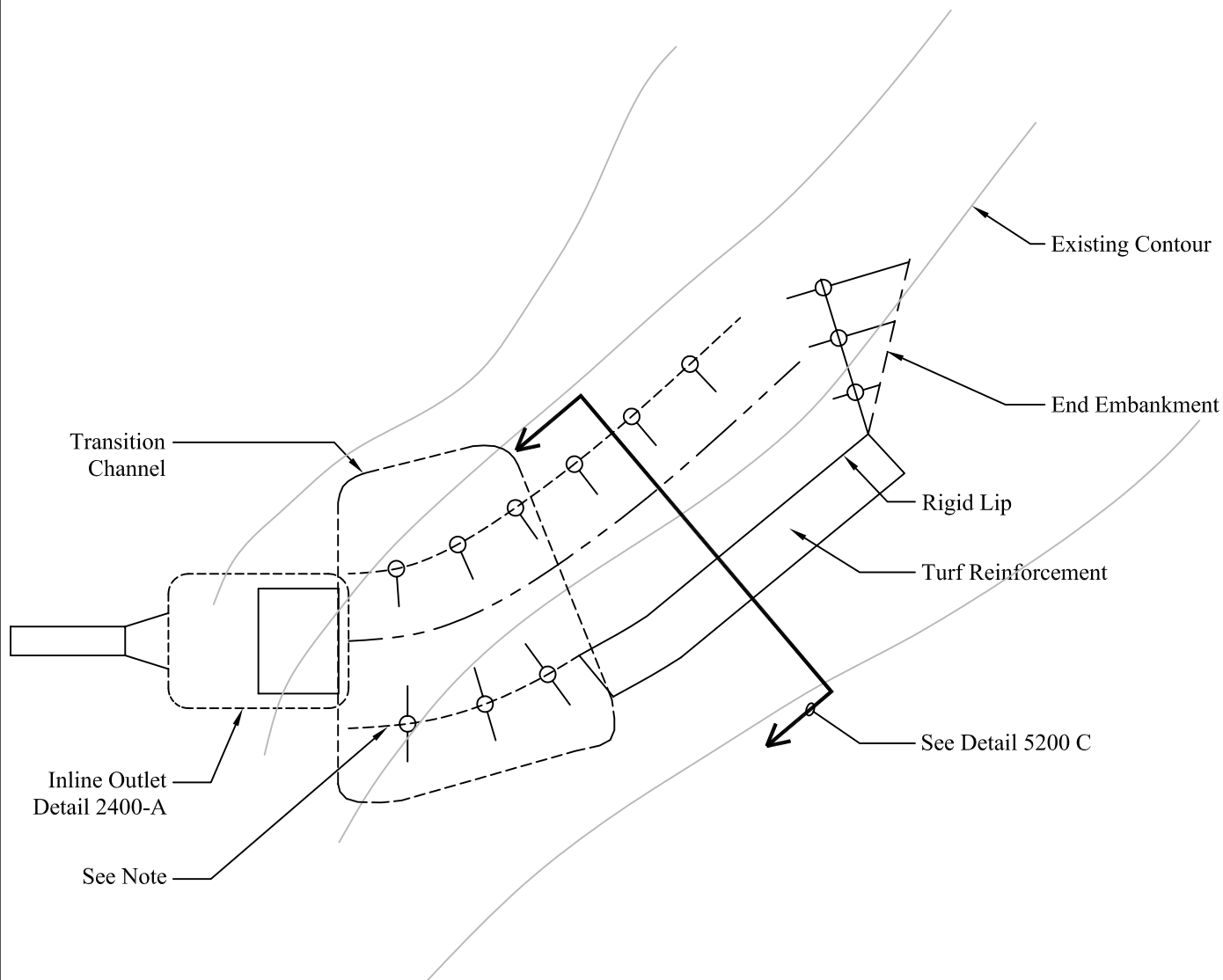
NO SCALE

STORM SEWER OUTLET LATERAL TO STREAM, SHEET 2 OF 2
TOE BANK PROTECTION

PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION

UNIFIED GOVERNMENT

UG 5200-D
2008 Edition



NOTE:

Top Bank Of Transition Channel & End Embankment
To Be A Minimum Of 6" Above Rigid Lip.

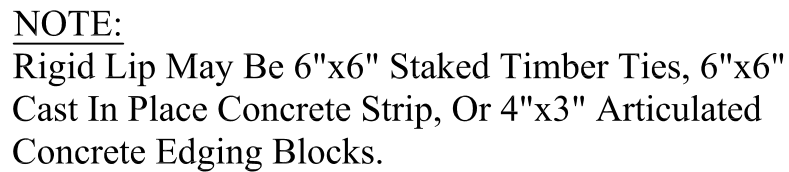
LEVEL SPREADER, SHEET 1 OF 2

PLAN VIEW

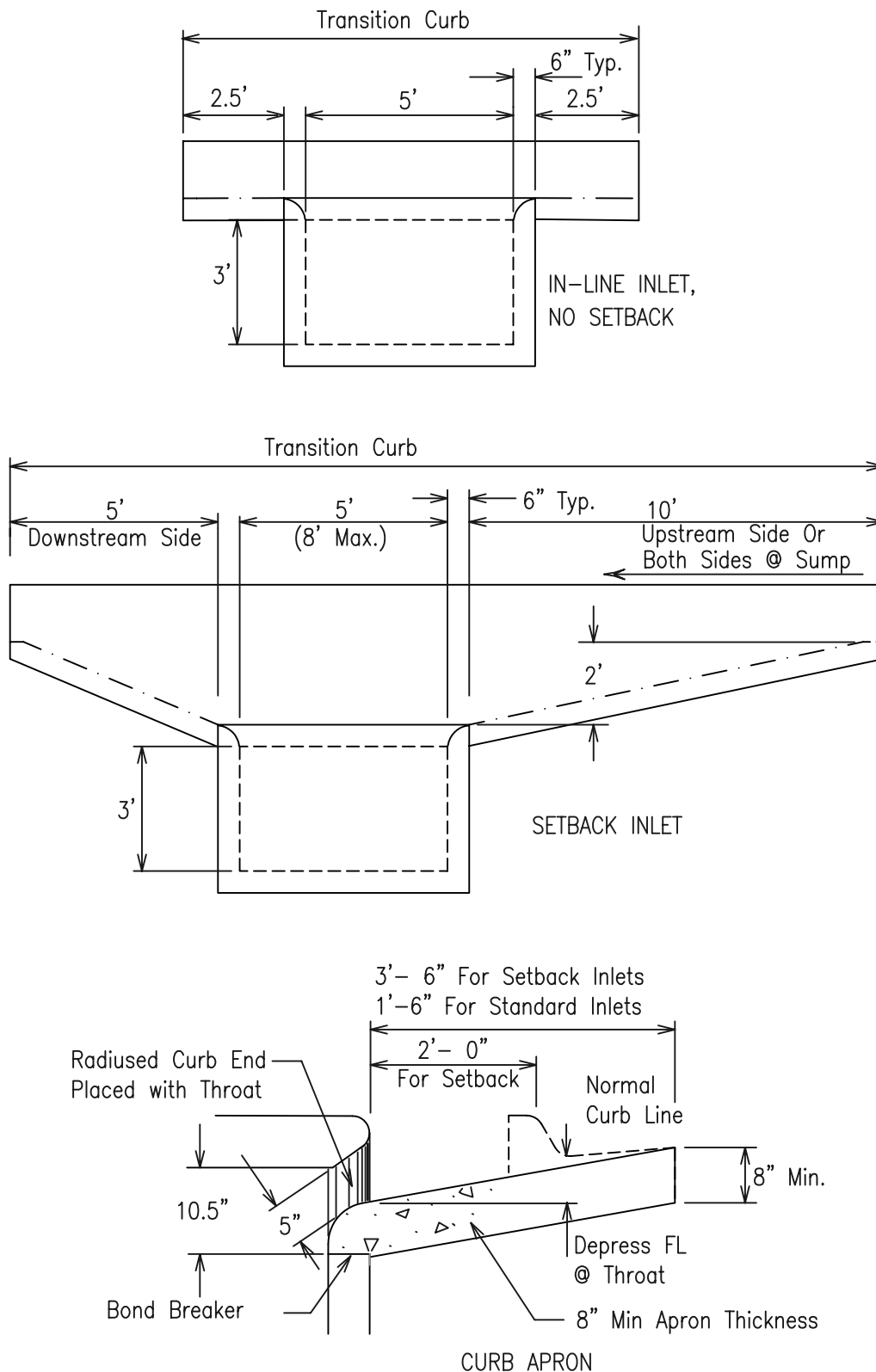
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION

UNIFIED GOVERNMENT

UG 5200-E
2008 Edition

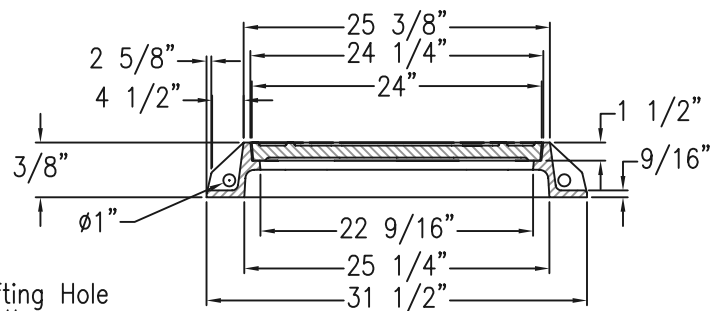
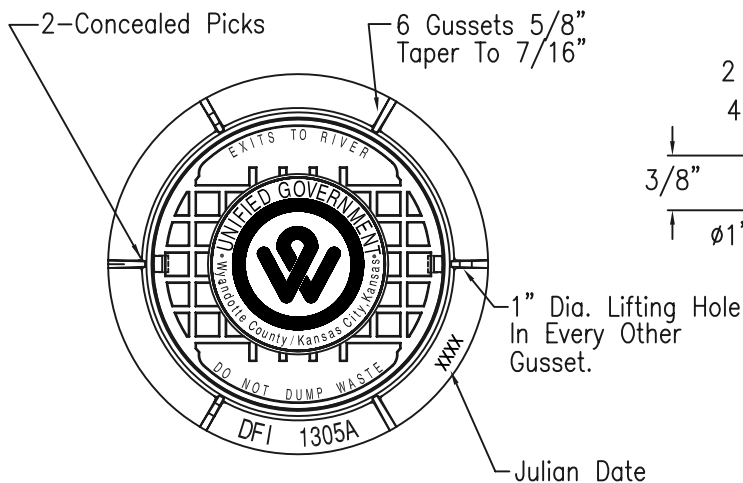
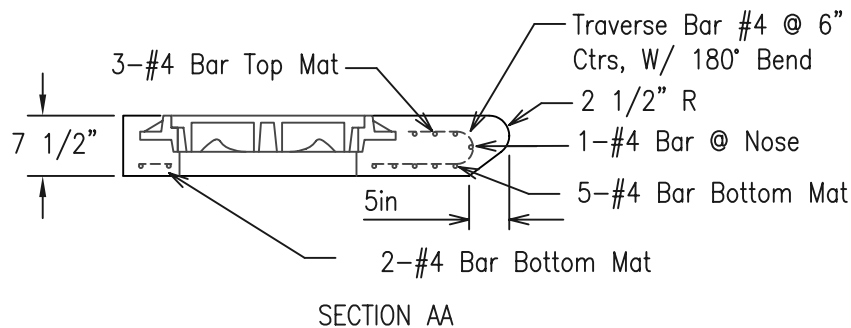
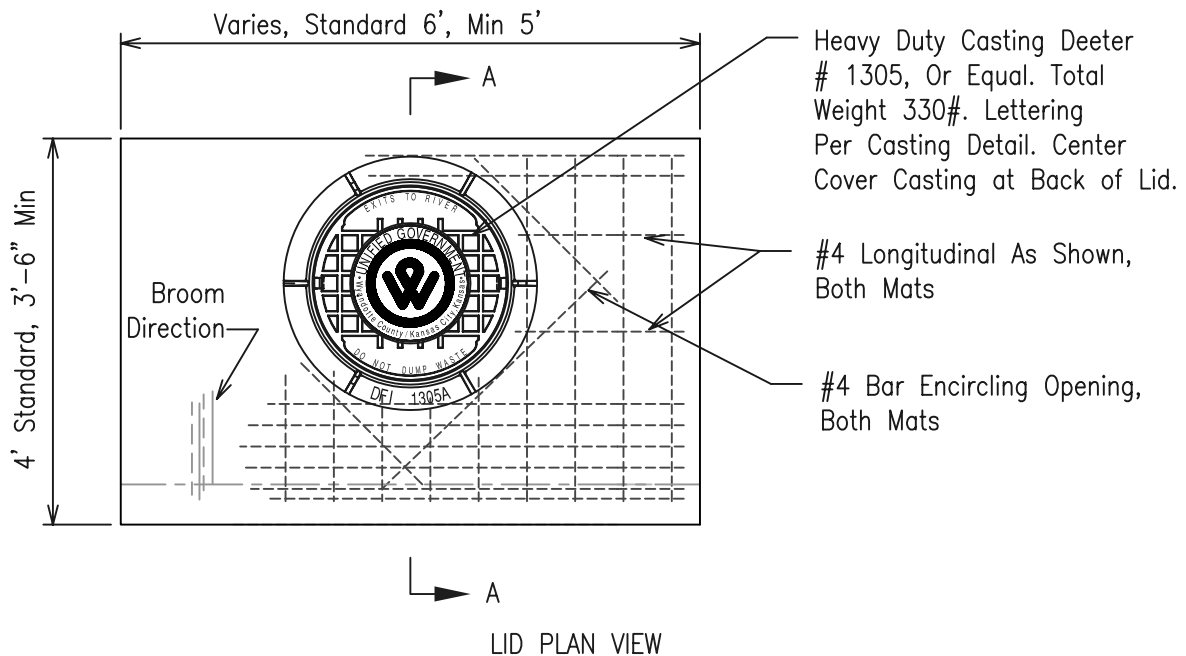


UG 5200–F
2008 Edition



CURB INLET DETAIL, SHEET 1 OF 4
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT

UG 5500-A
 2008 Edition



NOTE:

- Furnished With Machined Horizontal Bearing Surface.

Material: Gray Cast Iron ASTM A-48, Class 35B.

Weight: Frame 110 Lbs.
Cover 135 Lbs.

Finish: No Paint

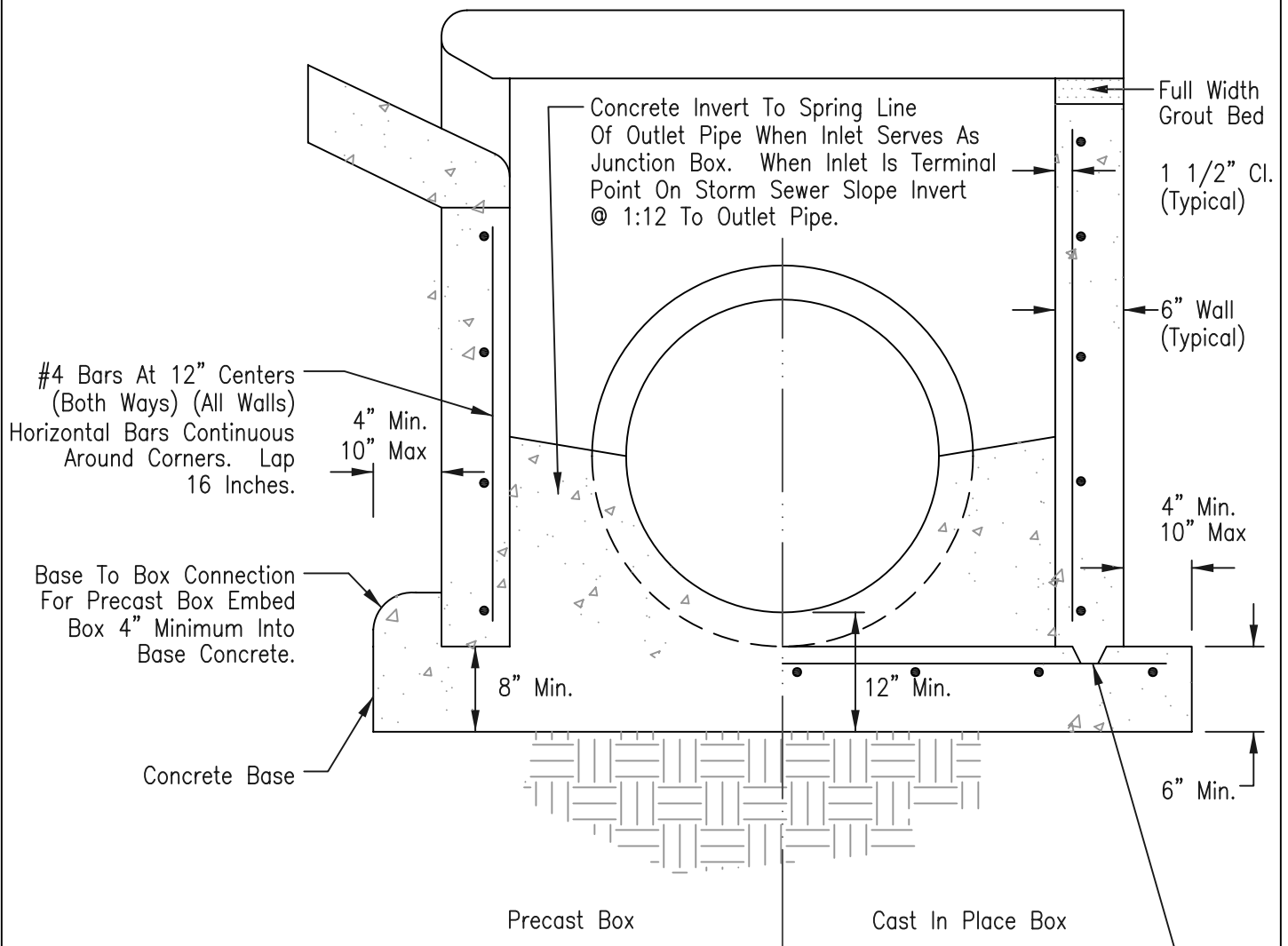
STANDARD CURB INLET CASTING (STORM)

CURB INLET DETAIL, SHEET 2 OF 4

PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION

UNIFIED GOVERNMENT

UG 5500-B
2008 Edition



NOTES:

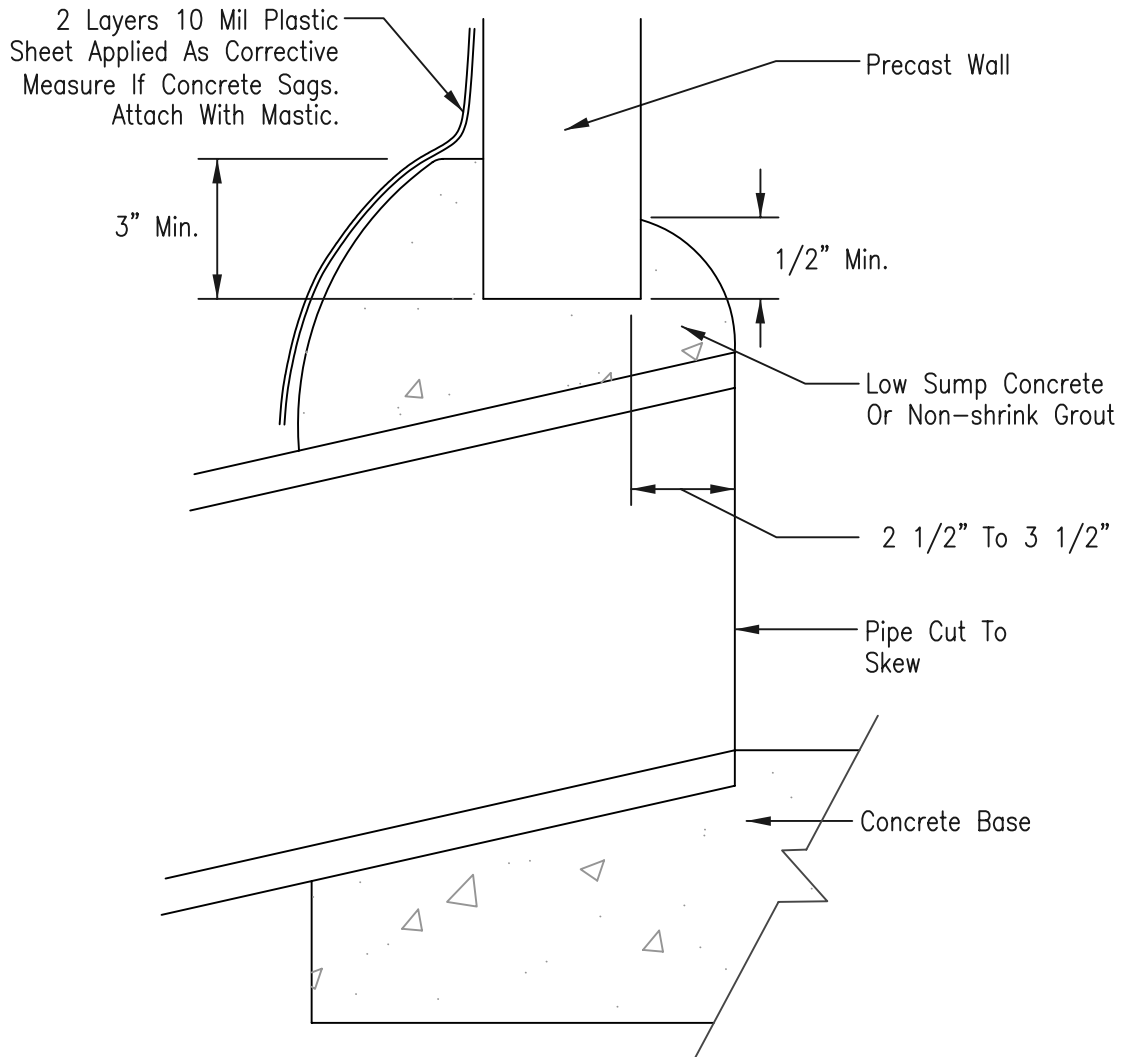
For Street Grades Up To 4% Tip Precast Box To Match Street Grade. For Grades Greater Than 4% Order Box With Appropriate Slope Across Top.

Precast Base May Be Used For Construction Of New Sewer Line But Shall Not Be Used For Replacement Of Existing Inlets.

Steps Not Required.

CURB INLET DETAIL, SHEET 3 OF 4
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT

UG 5500-C
2008 Edition



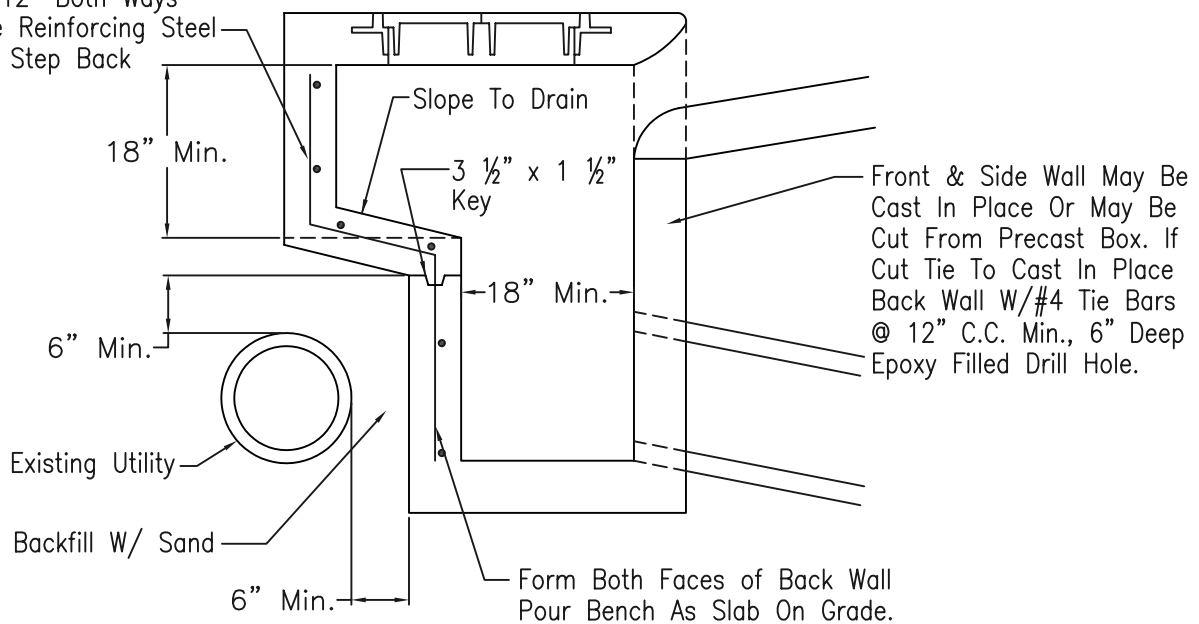
NOTES:

For Cast In Place Box, Place Pipe First &
Cast Wall To Fully Bond With Pipe.

CURB INLET DETAIL, SHEET 4 OF 4
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT

UG 5500-D
2008 Edition

4 @ 12" Both Ways
Continue Reinforcing Steel
Through Step Back
Section.



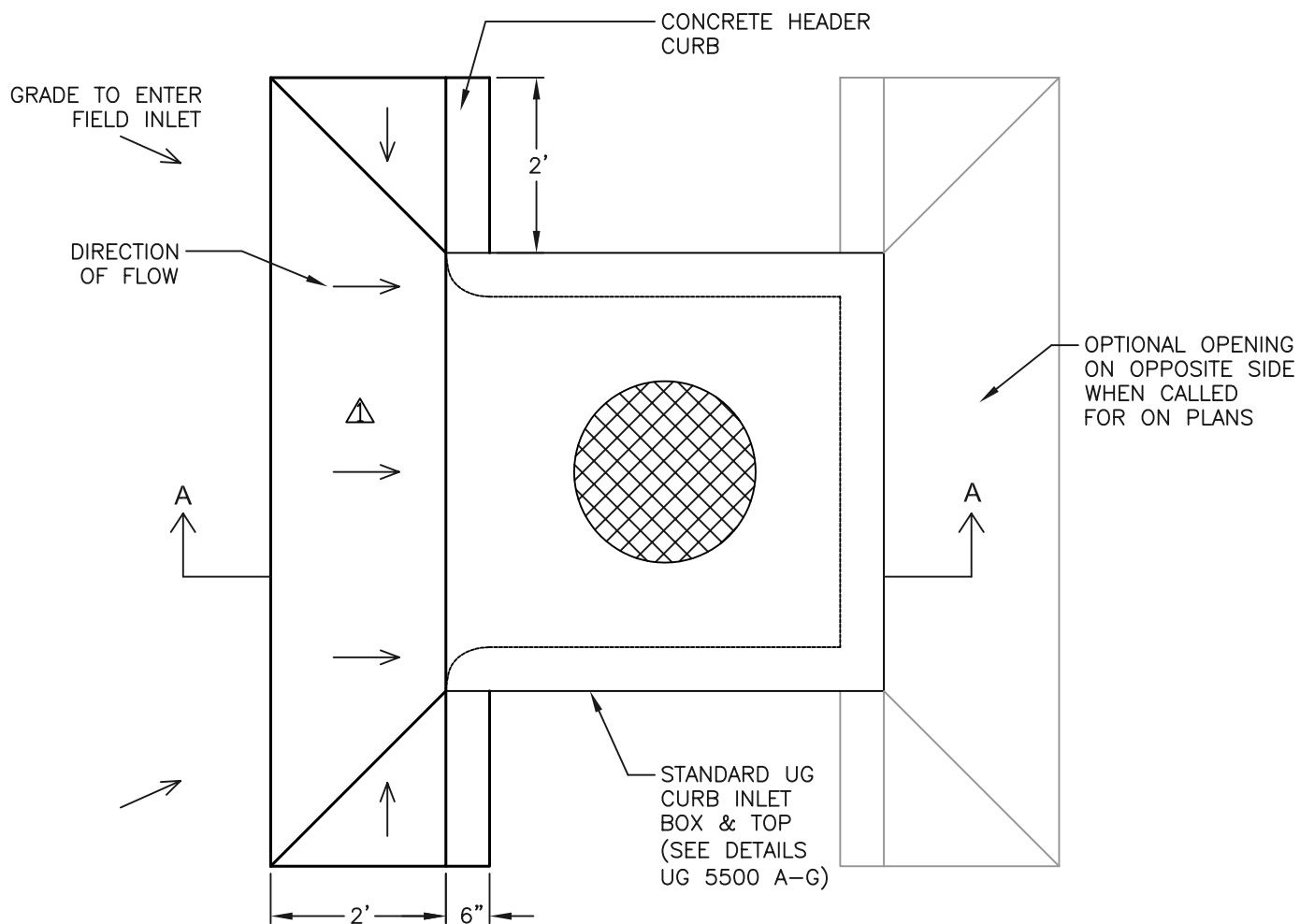
NOTES:

See Curb Inlet Detail For Other Requirements.

For Use Only When Approved By Engineer To Avoid Conflict With An Existing Utility.

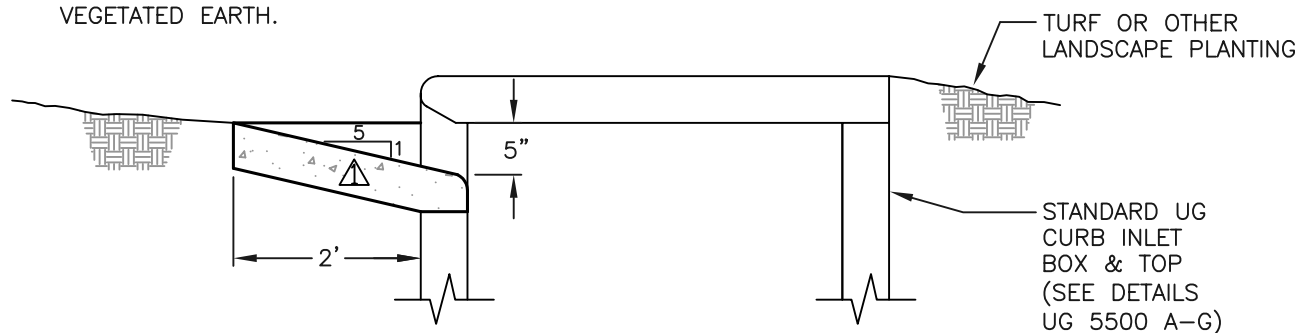
STEPPED BOX DETAIL FOR CURB INLET PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION UNIFIED GOVERNMENT

UG 5500-E
2008 Edition



PLAN VIEW

NOTE: FIELD INLET IS A SIDE OPENING INLET LOCATED AWAY FROM PAVEMENT & SURROUNDED BY VEGETATED EARTH.



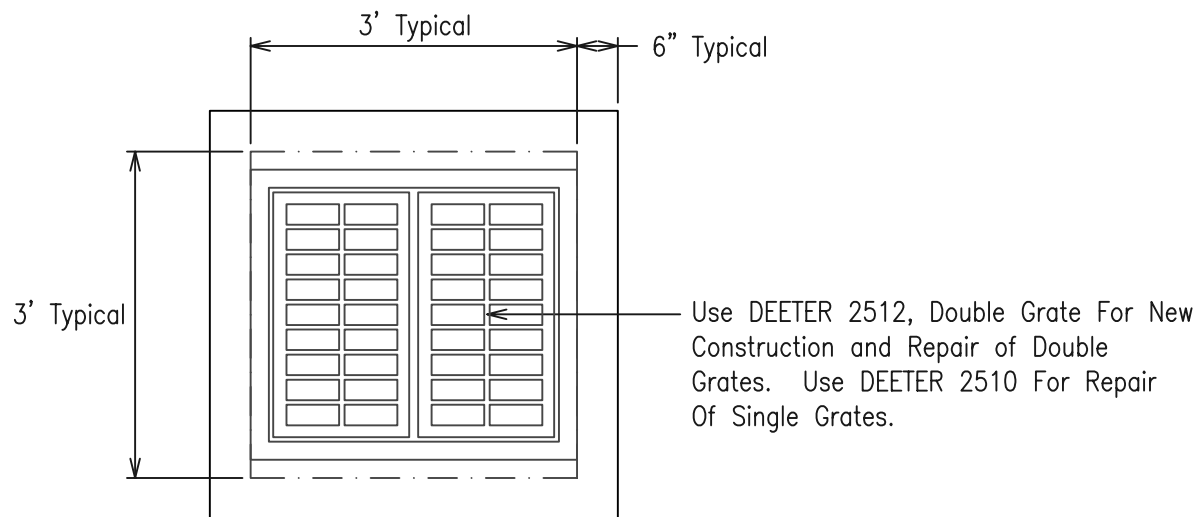
SECTION A-A

△ INSTALL CONCRETE THROAT IN ORIENTATION CALLED FOR ON PLANS

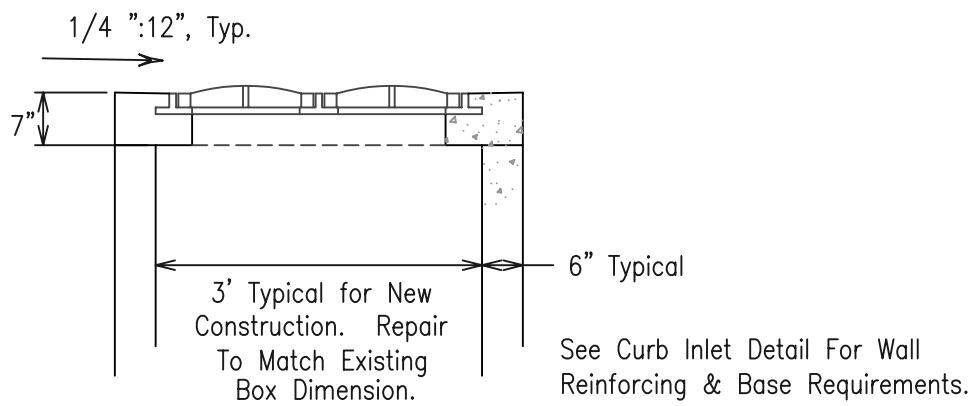
FIELD INLET

PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT

UG 5500-F
 2008 Edition



PLAN VIEW



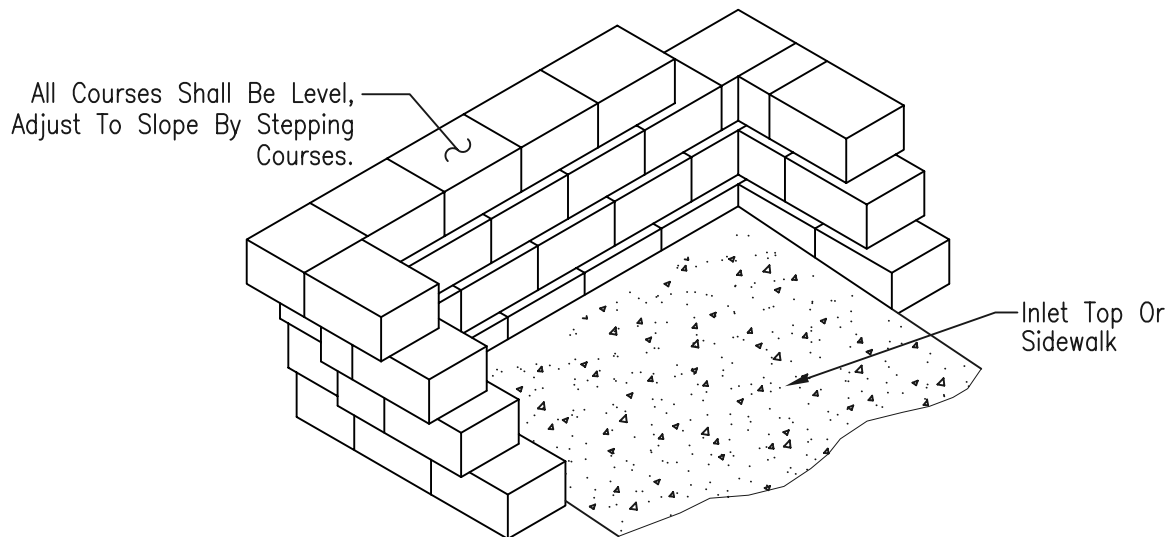
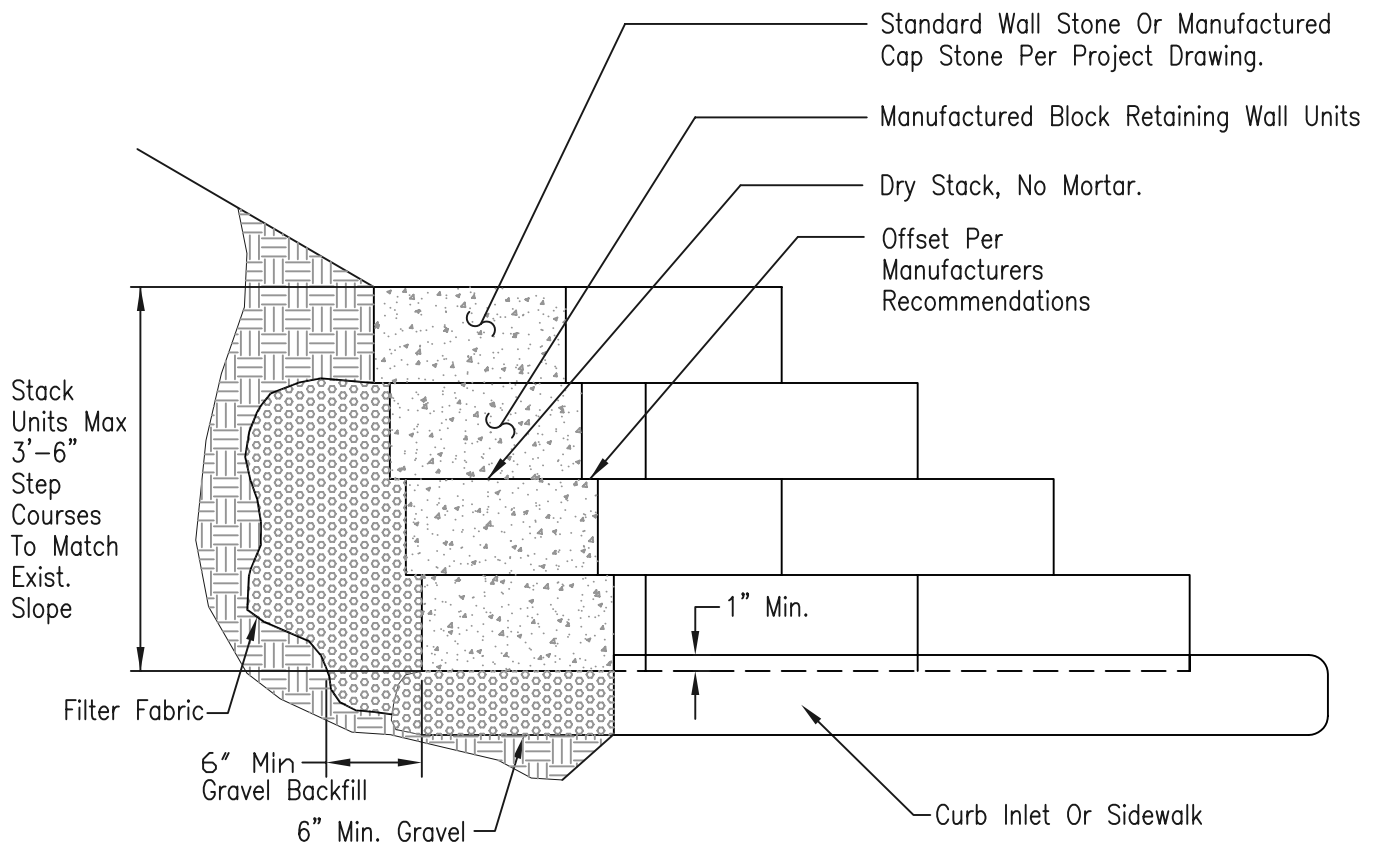
SECTION

NOTE:

Tops Cast Monolithic With Boxes
Are Acceptable.

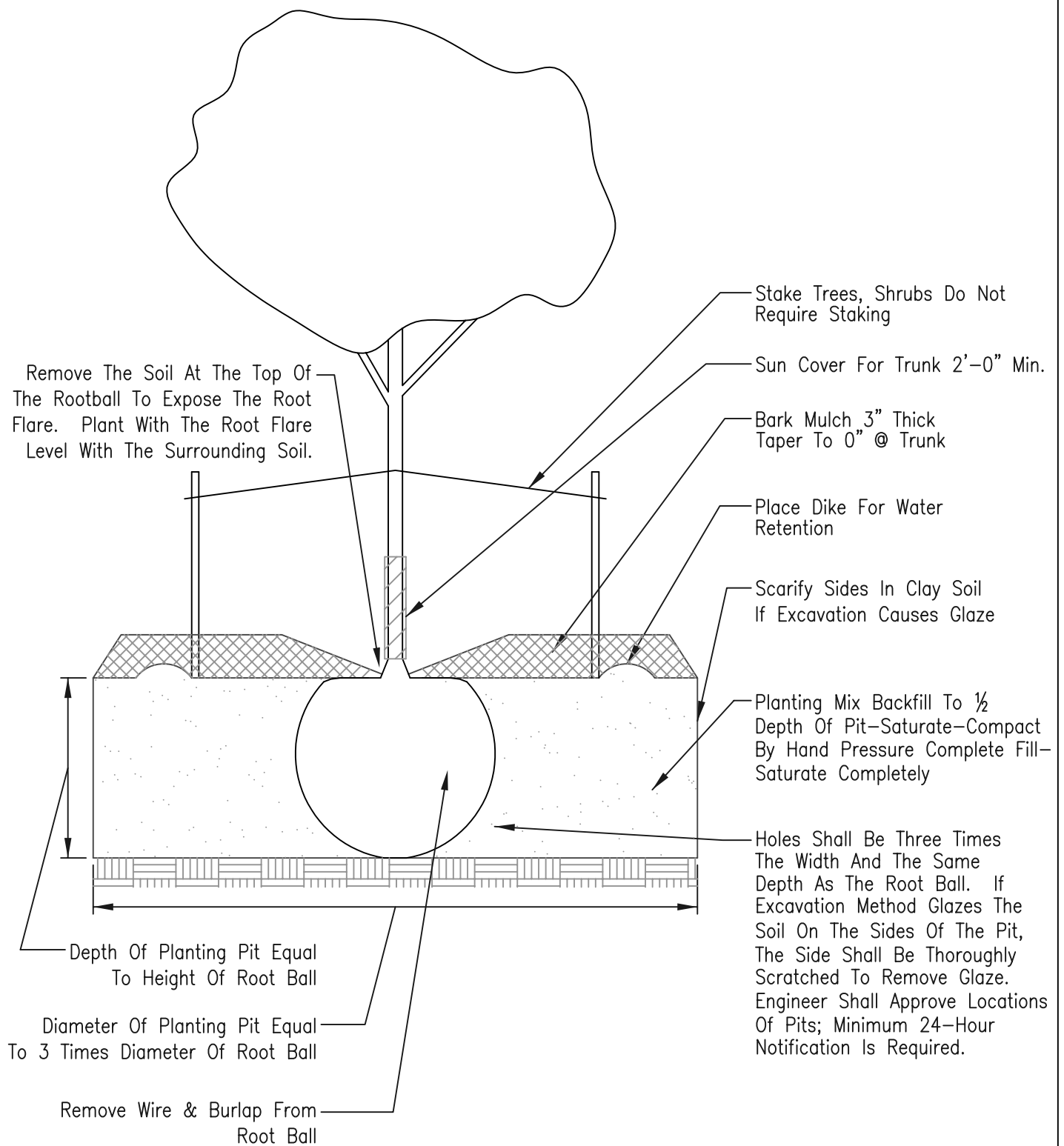
GRATED AREA INLET
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT

UG 5500-G
2008 Edition



**MANUFACTURED BLOCK RETAINING WALL
FOR USE WITH INLET OR SIDEWALK
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT**

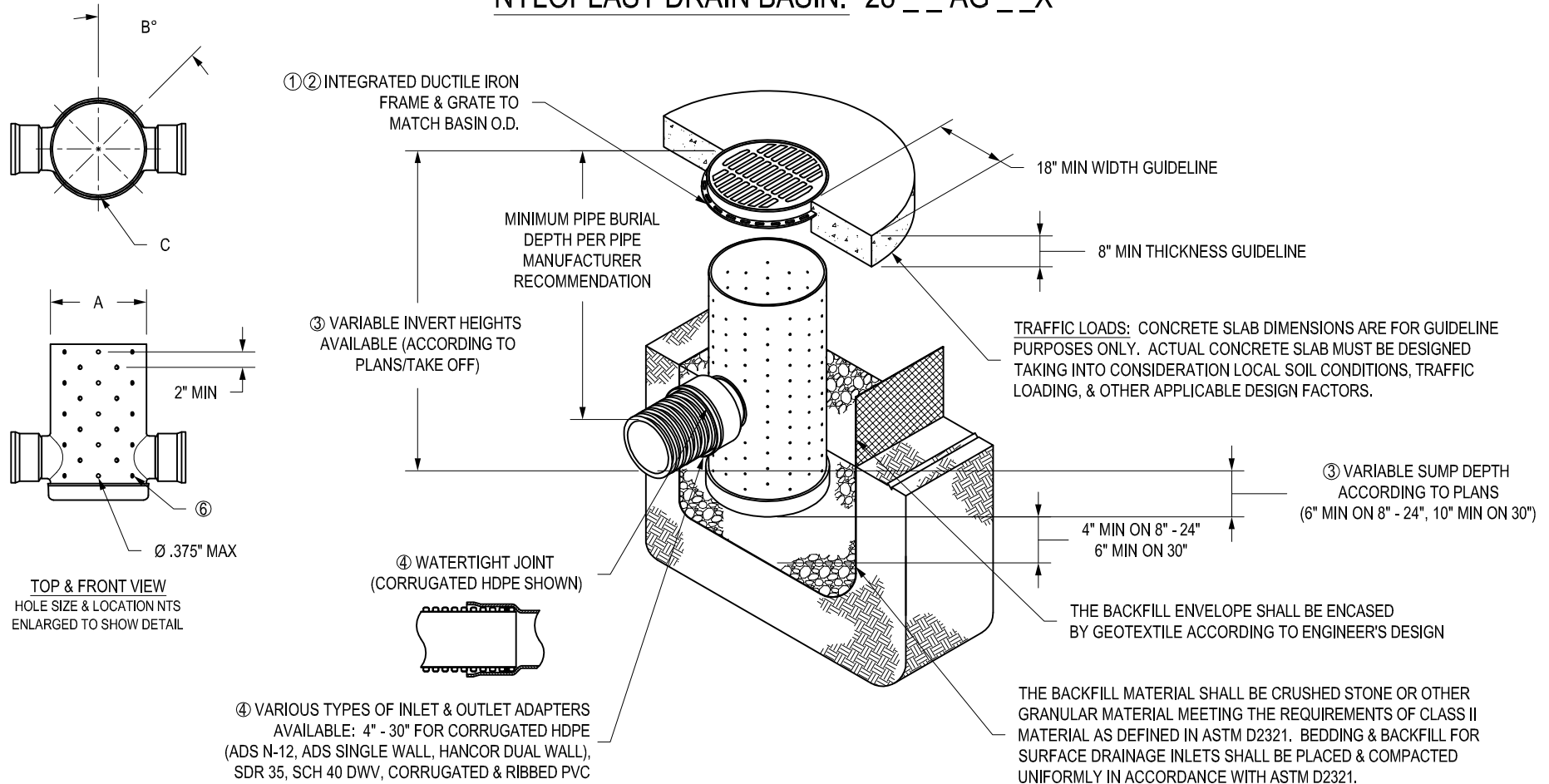
UG 6500-A
2008 Edition



TREE PLANTING
PUBLIC WORKS DEPARTMENT, ENGINEERING DIVISION
UNIFIED GOVERNMENT

UG 7100-A
 2008 Edition

NYLOPLAST DRAIN BASIN: 28 __ AG __ X



- ① - GRATES/SOLID COVERS SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05, WITH THE EXCEPTION OF THE 8", 10", 12", & 15" BRONZE GRATES.
- ② - FRAMES SHALL BE DUCTILE IRON PER ASTM A536 GRADE 70-50-05
- ③ - DRAIN BASIN TO BE CUSTOM MANUFACTURED ACCORDING TO PLAN DETAILS RISERS ARE NEEDED FOR BASINS OVER 84" DUE TO SHIPPING RESTRICTIONS SEE DRAWING NO. 7001-110-065
- ④ - DRAINAGE CONNECTION STUB JOINT TIGHTNESS SHALL CONFORM TO ASTM D3212 FOR CORRUGATED HDPE (ADS & HANCOR DUAL WALL) & SDR 35 PVC
- 5 - ADAPTERS CAN BE MOUNTED ON ANY ANGLE 0° TO 360°. TO DETERMINE MINIMUM ANGLE BETWEEN ADAPTERS SEE DRAWING NO. 7001-110-012, 7001-110-013, & 7001-110-014
- ⑥ - PERFORATIONS SHOULD NOT BE ON OR WITHIN 1" OF ADAPTERS.
- 7 - HOLES SHOULD BE STAGGERED EVERY OTHER ROW, AS SHOWN.
- 8 - GRATES SHALL MEET H-10 LOAD RATING FOR 12" - 24" PED
- 9 - GRATES SHALL MEET H-20 LOAD RATING FOR 30" PED & 12" - 30" STD & SOLID
- 10 - ALL BRONZE GRATES, DROP IN GRATES, & 8" & 10" PED/STD GRATES & SOLID COVERS ARE RATED FOR LIGHT DUTY APPLICATIONS ONLY
- 11 - DOME GRATES HAVE NO LOAD RATING

A	B°	C	PART #	GRATE OPTIONS				
8"	90°	4	2808AG	PEDESTRIAN/STANDARD	SOLID	BRONZE	DOME	DROP IN
10"	90°	4	2810AG	PEDESTRIAN/STANDARD	SOLID	BRONZE	DOME	DROP IN
12"	60°	6	2812AG	PEDESTRIAN STANDARD	SOLID	BRONZE	DOME	DROP IN
15"	60°	6	2815AG	PEDESTRIAN STANDARD	SOLID	BRONZE	DOME	DROP IN
18"	45°	8	2818AG	PEDESTRIAN STANDARD	SOLID	N/A	DOME	DROP IN
24"	45°	8	2824AG	PEDESTRIAN STANDARD	SOLID	N/A	DOME	DROP IN
30"	36°	10	2830AG	PEDESTRIAN STANDARD	SOLID	N/A	DOME	N/A

A - BASIN SIZE, B° - ANGLE BETWEEN HOLES, C - NUMBER OF HOLES

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DRAWN BY	EBC	MATERIAL	 3130 VERONA AVE BUFORD, GA 30518 PHN (770) 932-2443 FAX (770) 932-2490 www.nyloplast-us.com	
DATE	10-9-07			
APPD BY	CJA	PROJECT NO./NAME		
DATE	10-9-07			
DWG SIZE	A	SCALE	1:40	SHEET 1 OF 1
DWG NO.	7001-110-302	REV	A	

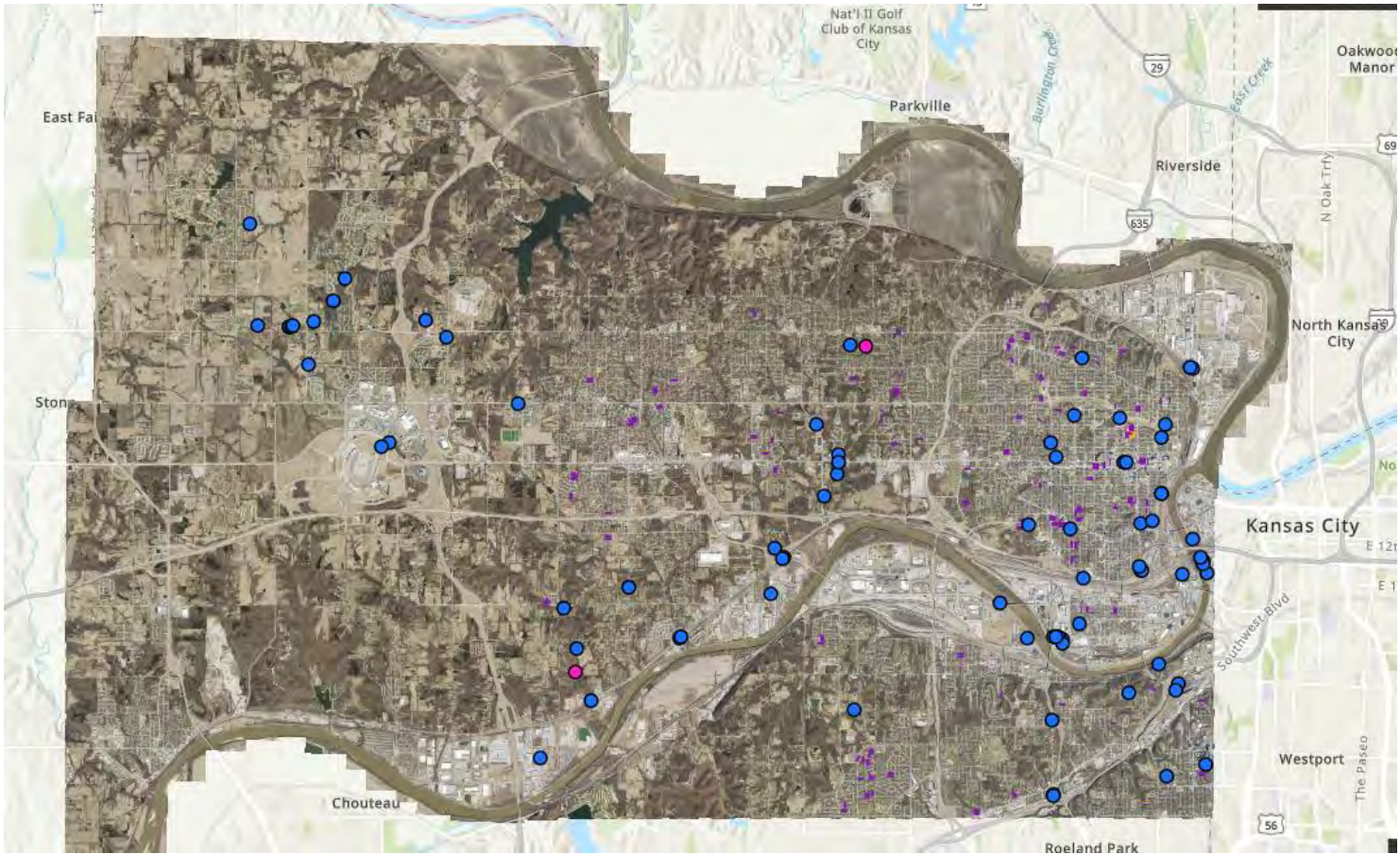
TITLE
8 IN - 30 IN PERFORATED DRAIN BASIN QUICK SPEC
DETAIL W/ GEO AROUND BACKFILL ENVELOPE

**UNIFIED GOVERNMENT OF
WYANDOTTE COUNTY/KANSAS CITY, KANSAS
2022 SANITARY AND STORM SEWER REPAIR AND REPLACEMENT - #1**

UG PROJECT ID – CMIP 6301

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LOCATION MAP
Not to Scale



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GENERAL NOTES

REHABILITATION SCHEDULES

1. Existing conditions on the Rehabilitation Schedules, including manhole and pipe depths, diameters, and materials; pipe lengths; and point repair locations; are from previous inspection efforts and/or sewer records and have not been field verified or surveyed. Contractor shall field inspect and verify existing conditions as necessary to perform the Work.

TECHNICAL DATA

1. An online GIS Site Map and Dashboard showing the location of the sewer pipe and manhole repairs identified in the Rehabilitation Schedules is available at:
<https://gisweb.wycokck.org/portal/apps/opsdashboard/index.html#/9afdb9211b2345ddbb807e24dccd3056>
 - a. The GIS Site Map and Dashboard may be accessed using a standard internet browser. Contact Tanner Stark, Unified Government, at 913-573-1383 for any access issues or concerns.
 - b. The GIS Site Map and Dashboard has filter, zoom, and search capabilities and other GIS data layers are available to view.
 - c. An electronic GIS shapefile of the online GIS Site Map is also available for download using the menu at the top right of the GIS Site Map and Dashboard.
 - d. Location of existing main sanitary sewers, storm sewers, and water lines shown on the GIS Site Map was obtained from the Unified Government GIS. Indicated scale is approximate; do not scale. The locations shown are believed to be reasonably correct, but do not purport to be absolutely so.
 - e. Location of existing right-of-way/property lines shown on the GIS Site Map was obtained from the Unified Government GIS. The locations shown are believed to be reasonably correct, but do not purport to be absolutely so.
 - f. Manholes identified to be **Rehabilitated** on the GIS Site Map include work specified as:
 - i. Non-Excavation Required Manhole Rehabilitation,
 - ii. Manhole Lining,
 - iii. Excavation Required Manhole Rehabilitation, and/or
 - iv. Miscellaneous Construction in the Sanitary Manhole and Storm Manhole and Structure Rehabilitation Schedules.
 - g. Manholes identified to be **Replaced/Installed** on the GIS Site Map include work specified as:
 - i. Install Flattop on Existing Manhole,
 - ii. Replace Existing Manhole Cone and Above,
 - iii. Replace Existing Manhole Barrel, Cone and Above, or
 - iv. Replace Existing Manhole in the Sanitary Manhole and Storm Manhole and Structure Rehabilitation Schedules.

2. In preparation of the Contract Documents, the following information regarding existing sewers and manholes were used:
 - a. Internal manhole inspection videos. Available internal manhole inspection videos may be viewed at:
https://trekk360.com/viewers/UG_Manhole_Rehab_2023/ using a standard internet browser with the User Name = **UG_MH360** and Password = **RFPmh!2023**.
 - b. Internal CCTV inspection videos. Available, individual internal CCTV inspection videos may be viewed at the Unified Government, 61 Market Street. Call 913-573-1360 to schedule an appointment.
3. The online GIS Site Map and Dashboard and information regarding existing sewers and manholes detailed above shall be considered technical data upon which Contractor may rely. It shall be understood that the information provided is not guaranteed by Owner or Engineer to be more than a general indication of the physical conditions likely to be found.
4. Contractor may rely upon the general accuracy of the “technical data” contained in such inspections and maps, but such inspections and maps are not Contract Documents. Except for such reliance on such “technical data,” Contractor may not rely upon or make any Claim against Owner, Engineer, or any of Engineer’s Consultants with respect to:
 - a. 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
 - b. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings; or
 - c. any Contractor interpretation of or conclusion drawn from any "technical data" or any such other data, interpretations, opinions, or information.
5. Responsibility for differing site conditions shall be determined in accordance with the Clause in the Invitation for Bids entitled "Differing Site Conditions" (Section 16 - General Conditions).
6. No other reports of explorations and tests or drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the Site are available.

CONSTRUCTION

1. No effort has been made by the Engineer to locate existing utilities. Before starting Work, the Contractor shall notify all utilities involved, and shall request them for cooperation effort to avoid breaking utility lines. The utility shall be notified immediately should a break occur in a line during construction under this contract. Any lines so broken by the Contactor shall be repaired according to the utility company’s standards at the expense of the Contractor.

2. Contractor shall be held responsible for contacting all utility companies for field location of all underground utility lines, whether shown on the GIS Site Map or not, prior to any excavation.
3. Contractor shall provide protection to prevent undermining or damage to the structural integrity of all utility poles, fences, road signs, or other items that parallel or cross the site and make arrangements with owning entity to provide temporary support or protection during construction.
4. Existing private sanitary sewer facilities serving buildings may not be shown. Contractor shall be held responsible for any damages done to these facilities during construction, and shall maintain continuous service to all buildings.
5. Contractor shall verify location, material, and diameter of existing service laterals and connections prior to construction. Provide fittings and materials, including reducers, as necessary to make necessary connections.
6. Contractor shall be responsible for verifying the location of all active service connections. Only active service connections shall be reinstated.
7. It shall be the responsibility of the Contractor to see that no water, silt, or foreign material enters the lines of the existing sanitary sewer to which these sewers are connected.
8. Blasting shall not be allowed to complete any of the work detailed on the Rehabilitation Schedules.
9. Construction activity (including demolition, clearing, storage of equipment and materials, installation of materials and equipment, and employee parking) shall be restricted to street right-of-way and Unified Government-owned property, along with other areas secured by Contractor by private agreement. If necessary to perform proposed Work, Contractor shall negotiate access agreements with property owners. Engineer shall be informed of Contractor’s private arrangements for construction access and shall be supplied a copy of the written agreement(s).
10. Flow in existing sanitary mains and service lines shall be maintained at all times and shall not be discharged to the environment.
11. Contractor shall utilize Best Management Practices to control erosion and sediment migration into storm drainage structures or channels. Contractor shall evaluate drainage patterns and provide erosion control devices as necessary. All costs associated with providing erosion control devices shall be considered subsidiary to the payment items provided on the Bid Form.
12. Contractor shall restore the project sites to conditions equal to or better than those existing prior to entry. All existing items and construction removed or damaged during the performance of the Work, regardless of location and whether or not indicated on these Rehabilitation Schedules, shall be repaired or replaced as detailed in the Contract Documents unless otherwise indicated on these Rehabilitation Schedules.

MAIN SANITARY SEWER REHABILITATION SCHEDULE (DIVISION 560)																		
LOCATION						EXISTING CONDITION							PROPOSED WORK ⁽¹⁾					
Line No.	Work Order Number	Pipe ID Number	Upstream Manhole Number	Downstream Manhole Number	Address	Pipe Diameter (in)	Televised Length ⁽²⁾ (ft)	Manhole to Manhole Segment Length (ft)	Pipe Material	Upstream Manhole Depth ⁽³⁾ (ft)	Downstream Manhole Depth ⁽³⁾ (ft)	Surface Type	N. Total Pipe Replacement	K. Construct Point Repair(s) ⁽⁴⁾		A. Install Cured-In-Place Pipe (CIPP) Liner		Notes
													Total Length (ft)	Total Length (ft)	Quantity	Liner Thickness	Total Length (ft)	
100	20-006894	GM-10070	098-006-MH	098-017-MH	3098 N 22ND ST	8	307	309	Vitrified Clay	7.72	7.62	Paved				6.0	309	
101	20-006895	GM-10074	098-017-MH	098-046-MH	3076 N 22ND ST	10	307	311	Vitrified Clay	7.62	9.63	Paved				6.0	311	
102	20-006051	GM-10214	105-021-MH	105-051-MH	2714 LATHROP AVE	12	298	298	Vitrified Clay	14.00	10.00	Paved				7.5	298	
103	20-007040	GM-10249	105-117-MH	098-118-MH	2714 LONGWOOD AVE	15	165	165	Vitrified Clay	9.41	10.90	Paved				9.0	165	
104	17-010693	GM-1062	123-028-MH	123-041-MH	1214 S 38TH ST	8	326	326	Vitrified Clay	2.68	6.55	Paved				6.0	326	
105	18-001947	GM-10653	119-086-MH	119-092-MH	3121 S 35TH ST	18	403	399	Vitrified Clay	13.00	15.80	Paved				12.0	403	
106	20-000635	GM-10826	127-020-MH	127-019-MH	3720 OHIO AVE	10	380	381	Vitrified Clay	8.40	7.50	Unpaved				6.0	381	
107	20-000636	GM-1130	128-025-MH	128-031-MH	3651 MINNESOTA AVE	8	201	201	Vitrified Clay	10.42	11.10	Unpaved				6.0	201	Level B critical facility notification required prior to initiating proposed Work. ⁽⁵⁾
108	20-013431	GM-11525	167-074-MH	167-088-MH	4808 PARALLEL DR	8	357	260	Vitrified Clay	10.55	3.50	Unpaved				6.0	357	
109	20-006044	GM-11545	168-116-MH	168-003-MH	3050 N 47TH TER	8	412	405	Vitrified Clay	8.00	2.86	Paved				6.0	412	
110	20-008817	GM-11795	189-006-MH	189-008-MH	2504 S 51ST TER	8	193	193	Vitrified Clay	5.00	5.35	Unpaved				6.0	193	
111	20-007656	GM-11808	189-030-MH	189-029-MH	5121 MELODY LN	8	308	311	Vitrified Clay	6.95	7.67	Unpaved				6.0	311	
112	20-010328	GM-11819	189-052-MH	189-053-MH	5133 HAGEMANN ST	8	89	93	Vitrified Clay	7.00	9.78	Unpaved				6.0	93	
113	20-010327	GM-11820	189-058-MH	189-059-MH	2749 S 51ST TER	8	124	130	Vitrified Clay	5.40	9.15	Paved				6.0	130	
114	20-006043	GM-11847	190-061-MH	190-060-MH	5149 LOCUST AVE	8	381	380	Vitrified Clay	8.88	5.42	Paved				6.0	381	
115	20-009224	GM-11859	190-088-MH	190-100-MH	5422 SUTTON AVE	8	326	326	Vitrified Clay	14.33	15.04	Paved				6.0	326	
116	20-006910	GM-11928	195-050-MH	195-018-MH	1000 S 56TH TER	10	302	302	Vitrified Clay	5.80	4.50	Paved				6.0	302	
117	17-004481	GM-12590	241-021-MH	241-020-MH	6420 PARKVIEW AVE	8	304	308	Vitrified Clay	13.29	9.29	Paved				6.0	308	
118	20-011661	GM-12785	264-025-MH	264-018-MH	7265 FOREST DR	8	128	134	Vitrified Clay	9.33	5.60	Paved				6.0	134	
119	20-004434	GM-13098	287-026-MH	287-027-MH	1741 N 78TH ST	8	332	317	Vitrified Clay	10.50	7.48	Unpaved				6.0	332	
120	20-004647	GM-13449	309-119-MH	310-037-MH	7850 FREEMAN AVE	8	170	163	Vitrified Clay	3.30	8.87	Unpaved				6.0	170	Level B critical facility notification required prior to initiating proposed Work. ⁽⁵⁾
121	20-004480	GM-13483	311-013-MH	311-025-MH	2427 N 83RD ST	8	345	362	Vitrified Clay	10.60	9.00	Paved				6.0	362	
122	20-006049	GM-146	105-088-MH	105-089-MH	2913 N 31ST ST	12	167	165	Vitrified Clay	11.42	8.43	Paved				7.5	167	
123	21-001080	GM-15119	076-114-MH	076-150-MH	12 S 14TH ST	10	109	102	Vitrified Clay	9.16	11.50	Paved				6.0	109	
124	20-004530	GM-15121	076-140-MH	077-035-MH	49 S 14TH ST	12	467	456	Vitrified Clay	4.56	22.50	Paved				9.0	467	
125	21-000172	GM-15226	076-107-MH	076-100-MH	61 S 17TH ST	10	318	320	Vitrified Clay	6.30	25.81	Paved				7.5	320	Level B critical facility notification required prior to initiating proposed Work. ⁽⁵⁾
126	20-004584	GM-15242	077-106-MH	077-108-MH	307 S 14TH ST	8	178	177	Vitrified Clay	8.30	5.96	Unpaved				6.0	178	
127	20-004470	GM-15276	093-154-MH	092-066-MH	64 S 25TH ST	8	383	370	Vitrified Clay	10.24	11.66	Paved				6.0	383	
128	19-013392	GM-15684	039-043-MH	039-042-MH	2910 N EARLY ST	12	304	296	Vitrified Clay	9.40	12.26	Paved				7.5	304	
129	16-009306	GM-15739	041-025-DP	041-029-MH	745 WALKER AVE	36	218	424	Vitrified Clay	9.00	15.22	Paved				22.5	424	Level B critical facility notification required prior to initiating proposed Work. ⁽⁵⁾
130	17-002331	GM-16199	064-008-MH	064-068-DP	864 TROUP AVE	15	61	63	Vitrified Clay	10.81	11.67	Paved				9.0	63	
131	20-004567	GM-16545	077-068-MH	077-069-MH	115 S 14TH ST	18	171	172	Vitrified Clay	9.08	10.00	Paved				9.0	172	
132	19-008142	GM-16812	017-096-MH	017-094-MH	2947 EATON ST	8	145	143	Vitrified Clay	10.52	9.33	Paved				6.0	145	Metal spoon protruding through joint at approximately 123 ft from the upstream manhole.
133	17-008891	GM-16816	018-005-MH	018-086-MH	2011 BRISTOW AVE	8	86	88	Vitrified Clay	5.45	4.89	Paved				6.0	88	

LOCATION						EXISTING CONDITION							PROPOSED WORK ⁽¹⁾					
Line No.	Work Order Number	Pipe ID Number	Upstream Manhole Number	Downstream Manhole Number	Address	Pipe Diameter (in)	Televised Length ⁽²⁾ (ft)	Manhole to Manhole Segment Length (ft)	Pipe Material	Upstream Manhole Depth ⁽³⁾ (ft)	Downstream Manhole Depth ⁽³⁾ (ft)	Surface Type	N. Total Pipe Replacement	K. Construct Point Repair(s) ⁽⁴⁾		A. Install Cured-In-Place Pipe (CIPP) Liner		Notes
													Total Length (ft)	Total Length (ft)	Quantity	Liner Thickness	Total Length (ft)	
134	17-002869	GM-16938	041-020-MH	041-021-MH	1942 N 7TH ST	12	313	320	Vitrified Clay	12.69	15.00	Paved				7.5	320	
135	19-000699	GM-173	105-150-MH	105-054-MH	2715 SPRING AVE	8	298	295	Vitrified Clay	11.00	11.00	Paved				6.0	298	Level B critical facility notification required prior to initiating proposed Work. ⁽⁵⁾
136	20-013169	GM-17318	033-138-MH	033-139-MH	2051 N 4TH ST	10	158	160	Vitrified Clay	13.30	11.00	Paved				6.0	160	Level B critical facility notification required prior to initiating proposed Work. ⁽⁵⁾
137		GM-17433	042-006-MH	041-100-MH	1610 N 8TH ST	10	149	159	Vitrified Clay	6.20	14.42	Paved				6.0	159	Prior to accessing site and initiating proposed Work, contact the Sumner Academy High School to coordinate acceptable site access and schedule. Work may need to be completed outside of normal business hours. Special surface restoration may be required. Manhole 041-100-MH may require excavation to perform CIPP lining. Manhole is anticipated to be buried approximately 12-inches below turf elevation. High priority. ⁽⁶⁾
138		GM-17434	042-007-MH	042-006-MH	1610 N 8TH ST	10	125	125	Vitrified Clay	17.30	6.20	Paved				7.5	125	Prior to accessing site and initiating proposed Work, contact the Sumner Academy High School to coordinate acceptable site access and schedule. Work may need to be completed outside of normal business hours. Special surface restoration may be required. High priority. ⁽⁶⁾
139	18-002702	GM-17471	144-067-MH	144-068-MH	1509 N 45TH TER	8	232	227	Vitrified Clay	6.04	5.82	Paved				6.0	232	
140	20-008818	GM-17485	156-069-MH	156-081-MH	2709 S 49TH ST	8	205	198	Vitrified Clay	6.00	6.30	Paved				6.0	205	Upstream pipe depth is assumed. Verify existing depth prior to initiating proposed Work. ⁽⁷⁾
141	20-008819	GM-1790	156-081-MH	156-091-MH	2725 S 49TH ST	8	209	203	Vitrified Clay	6.30	12.80	Paved				6.0	209	
142	20-006078	GM-18694	071-069-MH	071-068-MH	3002 N 13TH ST	8	113	116	Vitrified Clay	6.00	12.50	Unpaved				6.0	116	
143	20-006905	GM-18699	071-082-MH	071-079-MH	2938 CISSNA ST	8	175	167	Vitrified Clay	7.20	6.67	Paved				6.0	175	Level A critical facility notification required prior to initiating proposed Work. ⁽⁵⁾
144	20-006095	GM-18717	071-138-MH	071-128-MH	1618 QUINDARO BLVD	8	281	301	Vitrified Clay	10.00	9.00	Unpaved				6.0	301	Level B critical facility notification required prior to initiating proposed Work. ⁽⁵⁾
145	21-002294	GM-18913	076-079-MH	076-080-MH	5 S 16TH ST	10	157	160	Vitrified Clay	20.28	16.44	Paved				7.5	160	
146	21-000398	GM-18918	076-092-MH	076-063-MH	1232 REYNOLDS AVE	10	298	301	Vitrified Clay	20.48	14.47	Paved				7.5	301	
147	21-000173 21-000174	GM-18924	076-102-MH	076-075-MH	29 S 18TH ST	10	26	380	Vitrified Clay	3.40	7.76	Paved				6.0	380	
148	20-014471	GM-18938	077-052-MH	077-051-MH	1248 BUNKER AVE	10	114	121	Vitrified Clay	6.18	16.14	Unpaved				7.5	121	
149	20-008816	GM-1917	166-041-MH	166-042-MH	1824 N 50TH CT	8	167	174	Vitrified Clay	11.31	9.41	Unpaved				6.0	174	
150	19-014542	GM-19255	081-063-MH	081-064-MH	1820 S 15TH ST	8	221	221	Vitrified Clay	6.80	4.59	Unpaved				6.0	221	
151	21-001647	GM-19566	096-059-MH	096-079-MH	1873 N 26TH ST	10	258	328	Vitrified Clay	16.44	18.11	Paved				7.5	328	Level B critical facility notification required prior to initiating proposed Work. ⁽⁵⁾
152	20-009230	GM-19590	097-050-MH	097-053-MH	2116 N 18TH ST	12	281	286	Vitrified Clay	12.10	6.93	Paved				7.5	286	Level B critical facility notification required prior to initiating proposed Work. ⁽⁵⁾
153	20-000629	GM-19612	097-125-MH	097-126-MH	1958 STEWART AVE	8	328	328	Vitrified Clay	9.59	7.90	Paved				6.0	328	
154	20-007033	GM-1978	167-034-MH	167-033-MH	2605 MALONE DR	8	145	140	Vitrified Clay	17.47	7.95	Unpaved				6.0	145	
155	20-006360	GM-20555	019-055-MH	019-062-MH	2016 W 41ST AVE	8	405	408	Vitrified Clay	7.00	7.00	Paved				6.0	408	
156	21-000994	GM-2286	177-033-MH	177-084-MH	5146 WEBSTER AVE	8	303	315	Reinforced Plastic (Truss)	10.30	12.70	Paved				6.0	315	Pipe is plastic truss pipe. Adjust CIPP liner design and materials as necessary to account for existing pipe material.
157	20-006046	GM-2315	178-019-MH	178-022-MH	2521 N 53RD ST	8	265	260	Vitrified Clay	6.04	16.91	Paved				6.0	265	

LOCATION						EXISTING CONDITION							PROPOSED WORK ⁽¹⁾					
Line No.	Work Order Number	Pipe ID Number	Upstream Manhole Number	Downstream Manhole Number	Address	Pipe Diameter (in)	Televised Length ⁽²⁾ (ft)	Manhole to Manhole Segment Length (ft)	Pipe Material	Upstream Manhole Depth ⁽³⁾ (ft)	Downstream Manhole Depth ⁽³⁾ (ft)	Surface Type	N. Total Pipe Replacement	K. Construct Point Repair(s) ⁽⁴⁾		A. Install Cured-In-Place Pipe (CIPP) Liner		Notes
													Total Length (ft)	Total Length (ft)	Quantity	Liner Thickness	Total Length (ft)	
158		GM-2328	041-100-MH	041-099-MH	1610 N 8TH ST	36	139	142	Brick	14.42	14.36	Paved				21.0	142	Prior to accessing site and initiating proposed Work, contact the Sumner Academy High School to coordinate acceptable site access and schedule. Work may need to be completed outside of normal business hours. Special surface restoration may be required. Manhole 041-100-MH may require excavation to perform CIPP lining. Manhole is anticipated to be buried approximately 12-inches below turf elevation. High priority. ⁽⁶⁾ Level B critical facility notification required prior to initiating proposed Work. ⁽⁵⁾
159		GM-2329	041-101-MH	042-003-MH	644 FREEMAN CT	12	524	576	Vitrified Clay	21.95	16.44	Paved		86	1	9.0	576	Prior to accessing site and initiating proposed Work, contact the Sumner Academy High School to coordinate acceptable site access and schedule. Work may need to be completed outside of normal business hours. Perform point repair between 90 ft and 176 ft from the downstream manhole. Special surface restoration may be required. Manhole 042-003-MH may require excavation to perform CIPP lining. Manhole is anticipated to be buried approximately 12-inches below turf elevation. High priority. ⁽⁶⁾
160	21-000175	GM-2662	189-003-MH	189-002-MH	5102 DODSON AVE	8	310	330	Vitrified Clay	7.90	8.28	Paved				6.0	330	
161	20-008811	GM-2670	189-021-MH	189-020-MH	2531 S 53RD ST	8	127	142	Vitrified Clay	9.80	7.55	Paved				6.0	142	
162	20-008813	GM-2672	189-023-MH	189-022-MH	ROW	8	203	201	Vitrified Clay	8.24	3.30	Paved				6.0	203	
163	20-010325	GM-2688	189-056-MH	189-057-MH	2741 S 51ST TER	8	133	138	Vitrified Clay	8.22	6.48	Unpaved				6.0	138	
164	20-010326	GM-2689	189-057-MH	189-058-MH	2741 S 51ST TER	8	122	127	Vitrified Clay	6.48	5.40	Paved				6.0	127	
165	20-008451	GM-2692	189-063-MH	189-066-MH	2733 S 52ND CT	8	150	170	Vitrified Clay	6.55	8.14	Paved				6.0	170	
166	20-010452	GM-2729	190-057-MH	190-058-MH	5114 LOCUST AVE	8	195	199	Vitrified Clay	7.98	7.16	Unpaved				6.0	199	
167	20-009228	GM-2742	190-083-MH	190-082-MH	5412 OLIVER ST	8	184	184	Vitrified Clay	7.97	15.20	Unpaved				6.0	184	
168	20-008446	GM-2830	195-056-MH	195-055-MH	1045 S 57TH TER	8	268	229	Vitrified Clay	11.00	2.10	Unpaved				6.0	268	Upstream pipe depth is assumed. Verify existing depth prior to initiating proposed Work. ⁽⁷⁾
169	20-006041	GM-30	099-003-MH	099-002-MH	3500 N 18TH ST	18	216	215	Vitrified Clay	7.70	4.98	Paved				9.0	216	Confirm that pipe has not been CIPP-lined previously prior to initiating proposed Work.
170		GM-3286	215-020-MH	215-030-MH	1839 N 62ND ST	8	128	128	Vitrified Clay	8.46	14.00	Paved				6.0	128	High priority. ⁽⁶⁾
171	20-010899	GM-3319	216-033-MH	216-064-MH	6219 EVERETT AVE	8	151	154	Vitrified Clay	13.00	12.74	Paved				6.0	154	
172	20-006908	GM-3379	217-079-MH	217-078-MH	6212 ARMSTRONG AVE	8	319	262	Reinforced Concrete	9.00	10.70	Paved				6.0	319	
173	17-007464	GM-3489	237-014-MH	237-020-MH	1515 N 64TH DR	8	314	309	Vitrified Clay	13.41	10.72	Paved				6.0	314	
174	20-001352	GM-3632	237-051-MH	237-045-MH	1129 N 63RD TER	8	228	224	Vitrified Clay	10.31	15.31	Paved				6.0	228	
175		GM-4069	076-040-MH	076-148-MH	228 N VALLEY ST	48	166	166	Brick	11.00	12.16	Paved				27.0	166	
176	18-001675	GM-410	108-122-MH	108-105-MH	1200 N 28TH ST	10	436	429	Vitrified Clay	9.20	12.00	Paved				6.0	436	
177		GM-4606	275-025-MH	275-035-MH	2400 N 73RD ST	8		223	Vitrified Clay	11.00	11.03	Paved				6.0	223	Level A critical facility notification required prior to initiating proposed Work. ⁽⁵⁾ High priority. ⁽⁶⁾ Upstream manhole depth is assumed. Verify existing depth prior to initiating proposed Work. ⁽⁷⁾
178	20-007657	GM-4918	286-086-MH	286-085-MH	7505 GREELEY AVE	8	382	394	Vitrified Clay	11.35	11.73	Paved				6.0	394	
179	17-007983	GM-4944	018-084-MH	018-085-MH	3118 FRANCIS ST	8	124	105	Vitrified Clay	6.01	4.58	Paved				6.0	124	

LOCATION						EXISTING CONDITION							PROPOSED WORK ⁽¹⁾					
Line No.	Work Order Number	Pipe ID Number	Upstream Manhole Number	Downstream Manhole Number	Address	Pipe Diameter (in)	Televised Length ⁽²⁾ (ft)	Manhole to Manhole Segment Length (ft)	Pipe Material	Upstream Manhole Depth ⁽³⁾ (ft)	Downstream Manhole Depth ⁽³⁾ (ft)	Surface Type	N. Total Pipe Replacement	K. Construct Point Repair(s) ⁽⁴⁾		A. Install Cured-In-Place Pipe (CIPP) Liner		Notes
													Total Length (ft)	Total Length (ft)	Quantity	Liner Thickness	Total Length (ft)	
180	18-018894	GM-4966	287-006-MH	287-015-MH	1937 N 75TH DR	8	337	316	Vitrified Clay	12.34	9.00	Paved				6.0	337	
181	20-004435	GM-4983	287-039-MH	287-026-MH	1726 N 77TH TER	8	178	186	Vitrified Clay	10.50	10.50	Unpaved				6.0	186	
182	20-006047	GM-4984	287-040-MH	287-026-MH	1714 N 77TH TER	8	302	292	Vitrified Clay	11.30	10.50	Unpaved				6.0	302	
183	20-006048	GM-4985	287-041-MH	287-040-MH	1706 N 77TH TER	8	205	193	Vitrified Clay	10.21	11.30	Unpaved				6.0	205	
184		GM-6315	341-001-MH	340-001-MH	8700 KANSAS AVE	36	472	478	Reinforced Concrete	13.82	16.00	Paved				22.5	478	High priority. ⁽⁶⁾
185	20-013407	GM-728	166-072-MH	166-022-MH	4931 PARALLEL PKWY	15	176	176	Vitrified Clay	10.19	8.52	Unpaved				9.0	176	
186	20-002350	GM-736	030-136-MH	030-035-MH	613 N 5TH ST	8	42	45	Vitrified Clay	5.20	11.07	Paved				6.0	45	
187		GM-7591	041-123-MH	041-122-MH	745 WALKER AVE	24	122	102	Vitrified Clay	13.90	15.90	Paved				15.0	122	
188	16-008945	GM-7593	041-125-MH	041-024-MH	1720 N 8TH ST	24	88	88	Vitrified Clay	17.60	18.58	Paved	88					
189	20-000036	GM-760	115-062-MH	115-065-MH	1724 HAAS DR	8	209	208	Vitrified Clay	9.70	14.22	Paved				6.0	209	Level A critical facility notification required prior to initiating proposed Work. ⁽⁵⁾
190		GM-7907	076-174-MH	076-040-MH	225 N THORPE ST	48	160	164	Brick	13.10	11.00	Paved				27.0	164	
191	20-012269	GM-8316	049-021-MH	049-020-MH	620 SHAWNEE RD	8	202	202	Vitrified Clay	9.40	9.74	Paved				6.0	202	
192	21-002291	GM-838	118-011-MH	118-010-MH	2611 LINDEN CT	8	279	280	Vitrified Clay	5.58	4.90	Paved				6.0	280	
193		GM-8406	052-045-MH	052-049-MH	3149 W 44TH TER	8	130	146	Vitrified Clay	5.42	10.11	Unpaved		25	1	6.0	146	Perform point repair between the downstream manhole and 25 ft upstream of the downstream manhole.
194		GM-8414	052-063-MH	052-049-MH	3160 W 45TH AVE	8	52	54	Vitrified Clay	6.00	10.11	Unpaved				6.0	54	High priority. ⁽⁶⁾
195	20-008815	GM-8495	165-070-MH	165-062-MH	4859 WASHINGTON AVE	8	256	251	Vitrified Clay	10.76	7.51	Paved				6.0	256	
196	19-004272	GM-8571	055-027-MH	055-030-MH	2108 S BOEKE ST	8	103	92	Cast Iron	12.00	15.40	Paved				6.0	103	
197	19-003850	GM-8758	058-022-MH	079-035-MH	1124 SHAWNEE AVE	10	215	212	Vitrified Clay	10.88	19.48	Paved				7.5	215	
198	19-014241	GM-8776	058-066-MH	058-067-MH	1109 SHAWNEE AVE	8	43	51	Vitrified Clay	11.44	12.80	Paved				6.0	51	
199		GM-9086	065-080-MH	065-120-FT	1128 LAFAYETTE AVE	12	413	414	Vitrified Clay	16.70	8.74	Paved				7.5	414	Consult with Owner prior to beginning Work on this site. Downstream end is a tee connection with no manhole structure. High priority. ⁽⁶⁾
200	19-014396	GM-9122	066-111-MH	066-110-MH	1052 LAUREL AVE	10	165	165	Vitrified Clay	14.87	12.39	Paved				6.0	165	
201	21-001111	GM-9391	076-098-MH	076-111-MH	2 S 14TH ST	8	278	281	Vitrified Clay	8.01	3.86	Paved				6.0	281	
202	21-001641	GM-9392	076-099-MH	076-110-MH	25 S 16TH ST	8	317	328	Vitrified Clay	14.20	5.54	Paved				6.0	328	
203	21-001611	GM-9394	076-112-MH	077-005-MH	22 S 14TH ST	8	353	356	Vitrified Clay	9.39	10.90	Paved				6.0	356	
204	20-006916	GM-9397	076-116-MH	076-140-MH	31 S 14TH ST	10	291	262	Vitrified Clay	6.66	4.56	Paved				6.0	291	

LOCATION						EXISTING CONDITION							PROPOSED WORK ⁽¹⁾					
Line No.	Work Order Number	Pipe ID Number	Upstream Manhole Number	Downstream Manhole Number	Address	Pipe Diameter (in)	Televised Length ⁽²⁾ (ft)	Manhole to Manhole Segment Length (ft)	Pipe Material	Upstream Manhole Depth ⁽³⁾ (ft)	Downstream Manhole Depth ⁽³⁾ (ft)	Surface Type	N. Total Pipe Replacement	K. Construct Point Repair(s) ⁽⁴⁾		A. Install Cured-In-Place Pipe (CIPP) Liner		Notes
													Total Length (ft)	Total Length (ft)	Quantity	Liner Thickness	Total Length (ft)	
205	20-004581	GM-9414	077-072-MH	077-071-MH	1249 BUNKER AVE	10	228	227	Vitrified Clay	20.78	11.98	Paved				7.5	228	Upstream manhole blocked by heavy debris. Perform manhole cleaning and debris removal as necessary to properly install CIPP lining.
206	20-004533	GM-9526	079-134-MH	079-170-MH	625 S VALLEY ST	10	92	90	Vitrified Clay	12.00	12.00	Paved				6.0	92	Level B critical facility notification required prior to initiating proposed Work. ⁽⁵⁾ Upstream and downstream manholes depths are assumed. Verify existing depths prior to initiating proposed Work. ⁽⁷⁾

⁽¹⁾Refer to Contract Specifications for detailed descriptions of the proposed Work.

⁽²⁾Length of main sewer in which internal CCTV inspection was performed. Note that the televised length may be less than the manhole to manhole segment length for various reasons, including obstructions.

⁽³⁾Approximate distance between the manhole rim elevation and manhole bottom elevation.

⁽⁴⁾Perform point repairs on a main sewer segment prior to CIPP lining of said main sewer segment.

⁽⁵⁾Refer to Level A and Level B critical facility notification requirements in Section 5300 of the Contract Specifications.

⁽⁶⁾All proposed Work for pipes labeled as High Priority shall be completed prior to initiating proposed Work for remaining pipes.

⁽⁷⁾Differences between actual and assumed pipe diameter and depth will be addressed as a differing site condition per the General Conditions.

⁽⁸⁾Where indicated, address cave-ins located at/near the pipe segment per the description of the proposed Work in the Contract Specifications.

LOCATION						EXISTING CONDITION							PROPOSED WORK ⁽¹⁾						
Line No.	Work Order Number	Pipe ID Number	Upstream Manhole Number	Downstream Manhole Number	Address	Pipe Diameter (in)	Televised Length ⁽²⁾ (ft)	Manhole to Manhole Segment Length (ft)	Pipe Material	Upstream Manhole Depth ⁽³⁾ (ft)	Downstream Manhole Depth ⁽³⁾ (ft)	Surface Type	N. Total Pipe Replacement	Install New Manhole (4)	K. Construct Point Repair(s) ⁽⁴⁾		A. Install Cured-In-Place Pipe (CIPP) Liner		Notes
													Total Length (ft)	Quantity (Each)	Total Length (ft)	Quantity	Liner Thickness (mm)	Total Length (ft)	
500		GM-21017	042-647-FT	042-188-FT	723 FREEMAN AVE	12	12	12	Vitrified Clay	10.00	10.00	Paved					9.0	12	Prior to accessing site and initiating proposed Work, contact the Sumner Academy High School Maintenance Department to coordinate acceptable site access and schedule. Work may need to be completed outside of normal business hours. Special surface restoration may be required. Structure may need to be installed at 042-188-FT to perform CIPP lining. High priority. ⁽⁶⁾ Upstream and downstream manhole depths are assumed. Verify existing depths prior to initiating proposed Work. ⁽⁷⁾
501		GM-21018	042-189-IT	042-188-FT	723 FREEMAN AVE	12	33	33	Vitrified Clay	10.00	10.00	Paved					9.0	33	Prior to accessing site and initiating proposed Work, contact the Sumner Academy High School Maintenance Department to coordinate acceptable site access and schedule. Work may need to be completed outside of normal business hours. Special surface restoration may be required. Structure may need to be installed at 042-188-FT to perform CIPP lining. High priority. ⁽⁶⁾ Upstream and downstream manhole depths are assumed. Verify existing depths prior to initiating proposed Work. ⁽⁷⁾
502		GM-21019	042-188-FT	042-190-NS	723 FREEMAN AVE	12	238	238	Vitrified Clay	10.00	10.00	Paved					9.0	238	Prior to accessing site and initiating proposed Work, contact the Sumner Academy High School Maintenance Department to coordinate acceptable site access and schedule. Work may need to be completed outside of normal business hours. Special surface restoration may be required. Structures may need to be installed at 042-188-FT and 042-190-NS to perform CIPP lining. High priority. ⁽⁶⁾ Upstream and downstream manhole depths are assumed. Verify existing depths prior to initiating proposed Work. ⁽⁷⁾
503		GM-21020	042-190-NS	041-100-MH	1610 N 8TH ST	12	23	23	Vitrified Clay	15.00	14.42	Unpaved					9.0	23	Prior to accessing site and initiating proposed Work, contact the Sumner Academy High School Maintenance Department to coordinate acceptable site access and schedule. Work may need to be completed outside of normal business hours. Special surface restoration may be required. Structure may need to be installed at 042-190-NS to perform CIPP lining. Manhole 041-100-MH may require excavation to perform CIPP lining. Manhole is anticipated to be buried approximately 12-inches below turf elevation. High priority. ⁽⁶⁾ Upstream pipe depth is assumed. Verify existing depth prior to initiating proposed Work. ⁽⁷⁾
504	19-005038	GMST-12031	234-539-IP	219-501-DP	6306 RIVERVIEW AVE	24	76	53	Corrugated Metal	10.00	10.00	Paved					10.5	76	Upstream and downstream manhole depths are assumed. Verify existing depths prior to initiating proposed Work. ⁽⁷⁾ High priority. ⁽⁶⁾
505	20-012627	GMST-13217	279-500-IP	279-501-DP	4250 N 74TH ST	18	N / A	37	Corrugated Metal	10.00	10.00	Paved	37						Upstream and downstream manhole depths are assumed. Verify existing depths prior to initiating proposed Work. ⁽⁷⁾
506	17-002700	GMST-13855	305-501-IP	306-560-IT	8136 SPEAKER RD	15	N / A	86	Reinforced Concrete	10.00	10.00	Paved	86						Upstream and downstream manhole depths are assumed. Verify existing depths prior to initiating proposed Work. ⁽⁷⁾
507	16-000122	GMST-14391	322-515-IP	321-531-FT	2616 N 85TH ST	18	N / A	29	Corrugated Metal	10.00	10.00	Paved	29						Upstream and downstream manhole depths are assumed. Verify existing depths prior to initiating proposed Work. ⁽⁷⁾
508		GMST-14557	326-504-IT	326-506-IT	522 N 83RD PL	18	45	45	Corrugated Metal	4.00	7.50	Paved	45						
509		GMST-14559	326-506-IT	326-507-DP	511 N 83RD TER	24	138	138	Corrugated Metal	7.50	4.00	Paved	138						High priority. ⁽⁶⁾
510		GMST-18558	061-635-IT	061-072-FT	201 N 10TH ST	12	20	14	Vitrified Clay	4.40	7.00	Paved	20						
511		GMST-18666	076-568-IT	076-148-MH	231 N VALLEY ST	15	50	55	Vitrified Clay	3.80	12.16	Paved					9.0	55	High priority. ⁽⁶⁾
512		GMST-18672	076-612-IT	076-058-MH	200 N THORPE ST	12	147	150	Vitrified Clay	5.70	12.43	Paved					7.5	150	
513		GMST-20328	062-772-IT	062-736-MH	954 MINNESOTA AVE	15	37	37	Reinforced Concrete	3.65	5.65	Paved					7.5	37	
514	19-005915	GMST-20666	142-546-FT	142-548-FT	2300 N 44TH ST	24	44	29	Corrugated Metal	10.00	10.00	Paved	44						High priority. ⁽⁶⁾ Upstream and downstream manhole depths are assumed. Verify existing depths prior to initiating proposed Work. ⁽⁷⁾
515		GMST-21242	306-560-IT	306-515-FT	8136 SPEAKER RD	18	N / A	28	Reinforced Concrete	10.00	10.00	Unpaved	28						Upstream and downstream manhole depths are assumed. Verify existing depths prior to initiating proposed Work. ⁽⁷⁾

LOCATION						EXISTING CONDITION							PROPOSED WORK ⁽¹⁾						
Line No.	Work Order Number	Pipe ID Number	Upstream Manhole Number	Downstream Manhole Number	Address	Pipe Diameter (in)	Televised Length ⁽²⁾ (ft)	Manhole to Manhole Segment Length (ft)	Pipe Material	Upstream Manhole Depth ⁽³⁾ (ft)	Downstream Manhole Depth ⁽³⁾ (ft)	Surface Type	N. Total Pipe Replacement	Install New Manhole (4)	K. Construct Point Repair(s) ⁽⁴⁾		A. Install Cured-In-Place Pipe (CIPP) Liner		Notes
													Total Length (ft)	Quantity (Each)	Total Length (ft)	Quantity	Liner Thickness (mm)	Total Length (ft)	
516		GMST-3020	042-630-IT	042-647-FT	723 FREEMAN AVE	12	18	18	Vitrified Clay	10.00	10.00	Unpaved					9.0	18	Prior to accessing site and initiating proposed Work, contact Sumner Academy High School to coordinate acceptable site access and schedule. Work may need to be completed outside of normal business hours. Special surface restoration may be required. High priority. ⁽⁶⁾ Upstream and downstream manhole depths are assumed. Verify existing depths prior to initiating proposed Work. ⁽⁷⁾
517		GMST-3021	042-629-IT	042-647-FT	723 FREEMAN AVE	12	31	31	Vitrified Clay	10.00	10.00	Unpaved					9.0	31	Prior to accessing site and initiating proposed Work, contact Sumner Academy High School to coordinate acceptable site access and schedule. Work may need to be completed outside of normal business hours. Special surface restoration may be required. High priority. ⁽⁶⁾ Upstream and downstream manhole depths are assumed. Verify existing depths prior to initiating proposed Work. ⁽⁷⁾
518		GMST-3056	043-565-MH	043-004-MH	800 MINNESOTA AVE	15	38	38	Vitrified Clay	4.00	16.84	Paved					10.5	38	
519		GMST-3280	044-685-IT	044-029-MH	702 OHIO AVE	15	15	21	Vitrified Clay	3.00	14.93	Paved	21						
520		GMST-3355	044-690-IT	044-029-MH	715 SPLITLOG AVE	15	111	106	Vitrified Clay	15.64	14.93	Paved					9.0	111	
521	15-002156	GMST-3922	051-541-IT	051-540-IT	3909 MISSION RD	15	39	40	Reinforced Concrete	2.50	3.00	Paved					7.5	40	
522		GMST-4211	058-536-IT	058-049-MH	905 SHAWNEE AVE	15	25	25	Vitrified Clay	3.10	7.83	Paved	25						
523		GMST-4212	058-540-IT	058-535-IT	925 ARGENTINE BLVD	15	307	298	Vitrified Clay	4.90	4.50	Paved					7.5	307	
524		GMST-4213	058-537-IT	058-215-FT	839 SHAWNEE AVE	12	18	21	Vitrified Clay	3.10	7.83	Paved	21						
525		GMST-4214	058-538-IT	058-214-FT	839 SHAWNEE AVE	15	17	17	Vitrified Clay	2.80	7.83	Paved	17						
526		GMST-4533	062-584-IT	062-583-IT	925 STATE AVE	12	68	67	Reinforced Concrete	4.77	5.99	Paved					6.0	68	
527	16-008715	GMST-7145	106-541-IT	106-542-IT	3101 GREELEY AVE	12	27	39	Polyvinyl Chloride	2.20	2.50	Paved	39				6.0	39	
528	19-005039	GMST-985	020-505-IT	020-503-NS	2045 W 42ND AVE	15	16	19	Reinforced Concrete	3.00	10.40	Paved					9.0	19	

⁽¹⁾Refer to Contract Specifications for detailed descriptions of the proposed Work.

⁽²⁾Length of main sewer in which internal CCTV inspection was performed. Note that the televised length may be less than the manhole/structure to manhole/structure segment length for various reasons, including obstructions.

⁽³⁾Approximate distance between the manhole rim elevation and manhole bottom elevation.

⁽⁴⁾Perform point repairs on a main sewer segment prior to CIPP lining of said main sewer segment.

⁽⁵⁾Refer to Level A and Level B critical facility notification requirements in Section 5300 of the Contract Specifications.

⁽⁶⁾All proposed Work for pipes labeled as High Priority shall be completed prior to initiating proposed Work for remaining pipes.

⁽⁷⁾Differences between actual and assumed pipe diameter and depth will be addressed as a differing site condition per the General Conditions.

⁽⁸⁾Where indicated, address cave-ins located at/near the pipe segment per the description of the proposed Work in the Contract Specifications.

LOCATION				EXISTING CONDITION					PROPOSED WORK ⁽¹⁾																							
Line No.	Work Order Number	Manhole Number	Address	Depth ⁽²⁾ (ft)	Map Depth (ft)	Wall Material	Diameter (ft)	Surface Type	H-2a. Replace Existing Cover with UG Standard Cover (Each)	Existing Cover with UG Standard Bolt Down Cover (Each)	H-4. Repair Cracks and Joints (Each Manhole)	H-5. Repair and Grout Pipe Seals (Each Manhole)	H-6a. Repair Bench and Trough (48-Inch Dia.) (Each Manhole)	H-6b. Repair Bench and Trough (60-Inch Dia.) (Each Manhole)	H-6c. Repair Bench and Trough (72-Inch Dia.) (Each Manhole)	I-1a. Install Cementitious Liner (48-Inch Dia.) (Vertical Feet)	I-1b. Install Cementitious Liner (60-Inch Dia.) (Vertical Feet)	I-1c. Install Cementitious Liner (72-Inch Dia.) (Vertical Feet)	I-2a. Install Epoxy Liner (48-Inch Dia.) (Vertical Feet)	I-2b. Install Epoxy Liner (60-Inch Dia.) (Vertical Feet)	I-2c. Install Epoxy Liner (72-Inch Dia.) (Vertical Feet)	I-4a. Install Cementitious and Epoxy Liners (48-Inch Dia.) (Vertical Feet)	J-1a. Replace Existing Frame and Cover with UG Standard Frame and Cover (Each Manhole)	J-1b. Replace Existing Frame and Cover with UG Standard Bolt Down Frame and Cover (Each Manhole)	J-2. Replace Grade Adjustment (Each Manhole)	J-3. Add Grade Adjustment (Each Manhole)	J-4c. Install Flattop on Existing Manhole (72-Inch Dia.) (Each)	J-6a. Replace Existing Manhole Barrel, Cone and Above (48-Inch Dia.) (Vertical Feet)	J-7a. Replace Existing Manhole (48-Inch Dia.) ⁽⁵⁾ (Each)	J-8a. Install Manhole Extra Depth (48-Inch Dia.) (Vertical Feet)	Notes	
300		008-035-MH	2890 FAIRFAX TRFY	9.6	9.6	Brick	4	Paved	1																							
301		013-001-MH	235 CENTRAL AVE	21.5	21.5	Pre-cast Concrete	4	Paved								21.5																
302		013-008-MH	1414 GENESSEE ST	13.9	13.9	Pre-cast Concrete	4	Unpaved															13.9									
303		013-009-MH	1414 GENESSEE ST	14.9	14.9	Pre-cast Concrete	4	Paved												14.9												
304		013-011-MH	200 S JAMES ST	18.5	18.5	Precast Concrete	4	Unpaved																		1						
305		013-134-MH	200 S JAMES ST	14.7	14.7	Precast Concrete	4	Unpaved																		1						
306		014-521-MH	200 S JAMES ST	22.4	22.4	Precast Concrete	5	Unpaved																			1					
307		019-075-MH	2000 OLATHE BLVD	5.8	5.8	Precast Concrete	4	Unpaved												5.8												
308		022-104-MH	4133 S MINNIE ST	10.8	10.8	Precast Concrete	4	Paved												10.8												
309		024-011-MH	1260 SOUTHWEST BLVD	20.2	20.2	T-Lock Lined	6	Unpaved																			1					
310		024-066-MH	1260 SOUTHWEST BLVD	35.0	35.0	Brick	6	Unpaved																								
311		025-013-MH	528 METROPOLITAN AVE	7.1	7.1	Precast Concrete	4	Paved												7.1												
312		027-020-MH	10 BERGER	20.4	20.4	Brick	4	Paved								20.4																
313		030-041-MH	400 N THOMPSON ST	16.8	16.8	Brick	4	Paved					1			16.8								1		1						
314		030-042-MH	400 N THOMPSON ST	17.8	17.8	Brick	4	Paved																								Repair cave-in. ⁽³⁾ Fix CMP connection at the manhole; void behind connection.
315		031-008-MH	416 FREEMAN AVE	16.0	15.6	Brick	4	Paved				1				16.0																
316		032-111-MH	403 RICHMOND AVE	13.8	13.7	Brick	4	Paved					1			13.8																
317		034-032-MH	2909 CHRYSLER RD	10.7	10.7	Brick	5	Paved																1								
318		041-016-MH	1925 N 9TH ST	15.7	15.7	Precast Concrete	4	Unpaved			1																					
319		043-002-MH	815 STATE AVE	12.9	12.9	Brick	4	Paved					1																			
320		043-004-MH	800 MINNESOTA AVE	17.4	17.4	Brick	4	Paved					1			17.4																
321		044-085-MH	516 REYNOLDS AVE	29.2	29.2	Brick	4	Paved																1				1				
322		044-109-MH	639 SIMPSON AVE	11.6	11.6	Brick	4	Paved								11.6																
323		045-111-MH	230 S 7TH ST	13.2	14.0	Brick	4	Paved						1		14.0																
324		046-011-MH	250 S 5TH ST	12.4	12.4	Brick	4	Paved								12.4																
325		046-066-MH	250 S 5TH ST	9.0	9.4	Precast Concrete	3	Unpaved											9.4													
326		049-035-MH	825 SHAWNEE RD	11.2	11.2	Brick	4	Paved				1	1			11.2																
327		071-151-MH	2841 ROOSEVELT ST	14.3	14.3	Brick	4	Paved								14.3																High priority. ⁽⁴⁾
328		073-043-MH	1932 N 13TH ST	17.5	17.5	Brick	4	Paved																								High priority. ⁽⁴⁾
329		074-114-MH	1703 NEBRASKA AVE	13.4	13.4	Precast Concrete	4	Paved																		1						
330	20-006914	076-116-MH	31 S 14TH ST	6.7	6.7	Brick	4	Paved								6.7																
331		078-015-MH	1201 MONTANA AVE	26.7	26.7	Precast Concrete	8	Paved																1		1						
332		079-079-MH	1237 TAYLOR AVE	12.7	12.7	Brick	4	Paved																								High priority. ⁽⁴⁾
333		080-019-MH	1517 ARGENTINE BLVD	27.3	27.3	Precast Concrete	6	Unpaved																				1				
334		080-027-MH	1600 ARGENTINE BLVD	25.1	25.8	Precast Concrete	6	Paved																				1				
335		080-028-MH	1700 ARGENTINE BLVD	25.0	25.0	Precast Concrete	5	Paved													25.0							1				
336		080-030-MH	1615 ARGENTINE BLVD	26.9	25.7	Precast Concrete	6	Paved																								
337		080-059-MH	1515 ARGENTINE BLVD	25.6	25.6	Precast Concrete	4	Unpaved											25.8									1				
338		084-002-MH	3103 S 24TH ST	14.0	14.0	Pre-cast	5	Unpaved									14.0															
339		087-019-MH	2011 S 18TH ST	4.8	4.8	Brick	4	Paved								4.8																
340		089-016-MH	950 S 25TH ST	22.4	22.4	Precast Concrete	4	Unpaved												22.4							1					
341	20-00																															

LOCATION				EXISTING CONDITION					SANITARY MANHOLE REHABILITATION SCHEDULE (DIVISION 560)																				PROPOSED WORK ⁽¹⁾									
Line No.	Work Order Number	Manhole Number	Address	Depth ⁽²⁾ (ft)	Map Depth (ft)	Wall Material	Diameter (ft)	Surface Type	H-2a. Replace Existing Cover with UG Standard Cover (Each)	Existing Cover with UG Standard Bolt Down Cover (Each)	H-4. Repair Cracks and Joints (Each Manhole)	H-5. Repair and Grout Pipe Seals (Each Manhole)	H-6a. Repair Bench and Trough (48-Inch Dia.) (Each Manhole)	H-6b. Repair Bench and Trough (60-Inch Dia.) (Each Manhole)	H-6c. Repair Bench and Trough (72-Inch Dia.) (Each Manhole)	I-1a. Install Cementitious Liner (48-Inch Dia.) (Vertical Feet)	I-1b. Install Cementitious Liner (60-Inch Dia.) (Vertical Feet)	I-1c. Install Cementitious Liner (72-Inch Dia.) (Vertical Feet)	I-2a. Install Epoxy Liner (48-Inch Dia.) (Vertical Feet)	I-2b. Install Epoxy Liner (60-Inch Dia.) (Vertical Feet)	I-2c. Install Epoxy Liner (72-Inch Dia.) (Vertical Feet)	I-4a. Install Cementitious and Epoxy Liners (48-Inch Dia.) (Vertical Feet)	J-1a. Replace Existing Frame and Cover with UG Standard Frame and Cover (Each Manhole)	J-1b. Replace Existing Frame and Cover with UG Standard Bolt Down Frame and Cover (Each Manhole)	J-2. Replace Grade Adjustment (Each Manhole)	J-3. Add Grade Adjustment (Each Manhole)	J-4c. Install Flattop on Existing Manhole (72-Inch Dia.) (Each)	J-6a. Replace Existing Manhole Barrel, Cone and Above (48-Inch Dia.) (Vertical Feet)	J-7a. Replace Existing Manhole (48-Inch Dia.) ⁽⁵⁾ (Each)	J-8a. Install Manhole Extra Depth (48-Inch Dia.) (Vertical Feet)	Notes							
358		330-002-MH	8345 SWARTZ RD	14.9	14.9	Precast Concrete	5	Unpaved									14.9																					
359		330-009-MH	8321 SWARTZ RD	22.2	22.2	Precast Concrete	6	Unpaved																					1									
360		336-005-MH	2520 S 88TH ST	22.0	22.0	Precast Concrete	4	Unpaved												22.0																		
361		384-011-MH	9005 PARALLEL PKWY	19.2	19.2	Precast Concrete	4	Unpaved			1																											
362		425-063-MH	3205 N 103RD TER	5.1	5.1	Precast Concrete	4	Unpaved																		1												
363		426-052-MH	10113 LEAVENWORTH RD	6.6	6.6	Precast Concrete	5	Paved																		1												
364		450-023-MH	FRANCE FAMILY DR	6.1	6.1	Precast Concrete	4	Paved															6.1	1														
365		450-025-MH	FRANCE FAMILY DR	9.4	9.4	Precast Concrete	4	Paved															9.4	1														
366	21-001229	468-041-MH	11092 WHISPERING LN	14.2	14.2	Precast Concrete	4	Unpaved																														
367		494-014-MH	11444 GEORGIA AVE	6.2	5.8	Precast Concrete	4	Unpaved																			1											
368		495-002-MH	11230 LEAVENWORTH RD	12.0	12.2	Precast Concrete	4	Unpaved			1																											
369		495-027-MH	11409 PARKVIEW AVE	15.4	15.4	Precast Concrete	4	Unpaved																		1												
370		510-003-MH	11606 LEAVENWORTH RD	17.7	17.9	Precast Concrete	4	Unpaved												17.9																		
371		510-004-MH	11620 LEAVENWORTH RD	10.2	9.7	Precast Concrete	4	Unpaved												10.2																		
372		510-005-MH	11620 LEAVENWORTH RD	12.5	12.5	Precast Concrete	4	Unpaved												12.5																		
373		535-009-MH	12024 LEAVENWORTH RD	7.4	7.4	Precast Concrete	4	Unpaved																1														
374		538-019-MH	4335 N 121ST TER	7.5	7.3	Precast Concrete	4	Unpaved												7.5																		

⁽¹⁾Refer to Contract Specifications for detailed descriptions of the proposed Work.

⁽²⁾Approximate distance between the manhole rim elevation and manhole bottom elevation.

⁽³⁾Where indicated, address cave-ins located at/near the manhole per the description of the proposed Work in the Contract Specifications.

⁽⁴⁾All proposed Work for manholes labeled as High Priority shall be completed prior to initiating proposed Work for remaining manholes.

⁽⁵⁾Differences between actual and assumed manhole depth, wall material, and diameter will be addressed as a differing site condition per the General Conditions.

⁽⁶⁾Field verify pipe sizes and angles, and rim and invert elevations prior to ordering manhole and initiating proposed Work.

⁽⁷⁾Provide an alternative repair method to repair defects in this manhole where indicated in the Procosal Questionnaire. Review the alternative repair presented in the Procosal Questionnaire with the Owner prior to ordering materials and initiating Work. Any changes to the Work presented herein will be addressed via Change Order. Price Procosal shall include price to replace this manhole as scheduled.

⁽⁸⁾Non-standard manhole structure shall be replaced with manhole conforming to ASTM C478 with a modified base. Manhole base diameter shall be minimum of 2-feet greater than the outside diameter of the largest pipe at the manhole. Provide proposed manhole design shop drawing for review prior to ordering materials and initiating Work.

STORM MANHOLE AND STRUCTURE REHABILITATION SCHEDULE (DIVISION 563)																	
LOCATION				EXISTING CONDITION					PROPOSED WORK ⁽¹⁾								
Line No.	Work Order Number	Manhole Number	Address	Depth ⁽²⁾ (ft)	Map Depth (ft)	Wall Material	Diameter (ft)	Surface Type	H-2a. Replace Existing Cover with UG Standard Cover (Each)	Existing Cover with UG Standard Bolt Down Cover (Each)	I-1a. Install Cementitious Liner (48-Inch Dia.) (Vertical Feet)	I-1b. Install Cementitious Liner (60-Inch Dia.) (Vertical Feet)	I-1c. Install Cementitious Liner (72-Inch Dia.) (Vertical Feet)	J-7a. Replace Existing Manhole (48-Inch Dia.) ⁽⁶⁾ (Each)	J-7b. Replace Existing Manhole (60-Inch Dia.) (Each)	J-7c. Replace Existing Manhole (72-Inch Dia.) (Each)	Notes
700	19-003475	053-519-IT	1039 SUNTREE	N / A	4.7	Precast Concrete	Unknown	Paved						1			Replace existing structure per Standard Detail. High priority. ⁽⁴⁾
701	19-006622	141-566-IT	2715 44TH	N / A	3.1	Unknown	Unknown	Unpaved						1			Replace existing structure per Standard Detail.

⁽¹⁾Refer to Contract Specifications for detailed descriptions of the proposed Work.

⁽²⁾Approximate distance between the manhole rim elevation and manhole bottom elevation.

⁽³⁾Where indicated, address cave-ins located at/near the manhole per the description of the proposed Work in the Contract Specifications.

⁽⁴⁾All proposed Work for manholes/structures labeled as High Priority shall be completed prior to initiating proposed Work for remaining manholes/structures.

⁽⁵⁾Differences between actual and assumed manhole depth, wall material, and diameter will be addressed as a differing site condition per the General Conditions.

⁽⁶⁾Field verify pipe sizes and angles, and rim and invert elevations prior to ordering manhole and initiating proposed Work.

CRITICAL FACILITIES

Critical Facility Level A⁽¹⁾ or Level B⁽²⁾	Pipe ID	Upstream Manhole	Downstream Manhole	Facility Name	Facility Type	Facility Address
B	GM-1130	128-025-MH	128-031-MH	Wyandotte Central Dialysis	Healthcare	3737 State Ave
B	GM-13449	309-119-MH	310-037-MH	Kansas City Presbyterian Manor	Nursing Home	7850 Freeman Ave
B	GM-15226	076-107-MH	076-100-MH	Grandview Park Presbyterian	Church	1613 Wilson Blvd
B	GM-15739	041-025-DP	041-029-MH	Apostolic Church of Jesus	Church	745 Walker Ave
B	GM-173	105-150-MH	105-054-MH	Roswell Church of Christ	Church	2900 Roswell Ave
B	GM-17318	033-138-MH	033-139-MH	Bethel Church of God in Christ	Church	2063 N 4th St
A	GM-18699	071-082-MH	071-079-MH	Bryant Head Start Center	Daycare	2940 N 17th St
B	GM-18717	071-138-MH	071-128-MH	Good News Church Deliverance	Church	1618 Quindaro Blvd
B	GM-19566	096-059-MH	096-079-MH	New Chelsea Elementary School	School	2500 Wood Ave
B	GM-19590	097-050-MH	097-053-MH	Northwest Middle School	School	2400 N 18th St
B	GM-2328	041-100-MH	041-099-MH	Sumner Academy of Arts and Science	School	1610 N 8th St
A	GM-4606	275-025-MH	275-035-MH	A A A Connor Care Day Care Home	Daycare	2337 N 73rd St
A	GM-760	115-062-MH	115-065-MH	Barbara and John's Day Care Home	Daycare	1714 S 29th St
B	GM-9526	079-134-MH	079-170-MH	John Fiske Elementary School	School	625 S Valley St

⁽¹⁾Level A Critical Facilities require notification by the Unified Government at the beginning of the project per Section 5300 of the Contract Specifications.

⁽²⁾Level B Critical Facilities require hand delivered notification by the Contractor and delivery confirmation submitted to the Unified Government one week prior to initiating proposed Work at the site per Section 5300 of the Contract Specifications.