



**Department of Management Services**  
**Purchasing Division**  
241 West South Street  
Kalamazoo, MI 49007-4796  
Phone: 269.337.8020  
[www.kalamazoo.org](http://www.kalamazoo.org)

**REQUEST FOR QUOTE**  
**THIS IS NOT AN ORDER**

**PROJECT:** Virginia Ave Sanitary Lateral Install

**QUOTE REFERENCE NO:** 91345-005.0

**CONTACT:** Ethan Ray, Civil Engineer, at [rave@kalamazoo.org](mailto:rave@kalamazoo.org)

**ISSUE DATE:** May 29, 2026

**QUOTE RETURN DATE:** June 24, 2026, by end of business day (4:30 p.m. Local Time ET)

**SUBMITTAL INSTRUCTIONS:** Return on or before date above. **Mark envelope – Quotation – Virginia Ave Sanitary Lateral Install and due date.** This quote may also be emailed to [cokpurchasing@kalamazoo.org](mailto:cokpurchasing@kalamazoo.org).

**STATEMENT OF NO QUOTE**

**If you do not respond to this inquiry within the time set for the quote due date and time noted, it will be assumed that you can no longer supply this commodity/service, and your name will be removed from this bid list.**

- \_\_\_\_\_ Specifications are unclear (explain below).
- \_\_\_\_\_ We are unable to meet specifications.
- \_\_\_\_\_ Our schedule would not permit us to perform.
- \_\_\_\_\_ We do not offer this product or service.
- \_\_\_\_\_ Remove us from your bidders list for this commodity or service.

**REMARKS:** \_\_\_\_\_

**SIGNED:** \_\_\_\_\_ **NAME:** \_\_\_\_\_  
(Type or Print)

**TITLE:** \_\_\_\_\_ **DATE:** \_\_\_\_\_

**FIRM NAME:** \_\_\_\_\_  
(If any)

**ADDRESS:** \_\_\_\_\_  
(Street address) (City) (State) (Zip)

**PHONE:** \_\_\_\_\_ **EMAIL:** \_\_\_\_\_

**SUBMITTAL INSTRUCTIONS FOR QUOTES**

1. **EXAMINATION OF QUOTE DOCUMENT**-Before submitting a quote, bidders shall carefully examine the specifications and shall fully inform themselves as to all existing conditions and limitations. The bidder shall indicate in the quote the sum to cover the cost of all items included on the quote form.
2. **PREPARATION OF QUOTE**-The quote shall be legibly prepared in ink or typed. If a unit price or extension already entered by the bidder on the Request for Quote form is to be altered, it shall be crossed out and the new unit price or extension entered above or below and initialed by the bidder with ink. The quote shall be legally signed, and the complete address of the bidder given thereon.
3. **EXPLANATION TO VENDORS**- Any binding explanation desired by a vendor regarding the meaning or interpretation of the Request for Quote (RFQ) and attachments must be requested in writing, **at least 5 business days before the bid opening** so a reply may reach all prospective vendors before the submission of bids. Any information given to a prospective vendor concerning the RFQ will be furnished to all prospective vendors as an amendment or addendum to the RFQ if such information would be prejudicial to uninformed vendors. Receipt of amendments or addenda by a vendor must be acknowledged in the quote by attachment, or by letter before the time set for opening of quotes. Oral explanation or instructions given prior to the opening will not be binding.
4. **CASH DISCOUNTS**-Discount offered for payment of less than thirty (30) days will not be considered in evaluating quotes for award. Offered discounts of less than thirty (30) days will be taken if payment is made within the discount period, even though not considered in evaluation of the quote.
5. **WITHDRAWAL OF QUOTES**-Quotes may be withdrawn by a bidder or authorized representative by written request, but only if the withdrawal is made prior to the close of the business day set for receipt of quotes. Quotes may not be withdrawn for at least ninety (90) days after due date.
6. **UNIT PRICES**-If there is a discrepancy between unit prices and their extension, unit prices shall prevail.
7. **INFORMAL COMPETITION**-The City reserves the right to accept or reject any or all quotes and waive informalities and minor irregularities in the quotes received. The City will consider all quotes and make the purchasing decision most advantageous to the City and its interests.

**QUOTE FORM**

The undersigned having become thoroughly familiar with all of the bid/contract documents incorporated herein, the project site and the location conditions affecting the work, hereby proposes to perform everything required to be performed in strict conformity with the requirements of these documents, and to provide and furnish all the equipment, labor and materials necessary to complete in a professional manner the *Virginia Ave Sanitary Lateral Install*, meeting or exceeding the specifications as set forth herein for the prices as stated below.

**VIRGINIA AVE SANITARY LATERAL INSTALL**

<b>Item #</b>	<b>Description</b>	<b>Quantity</b>	<b>Unit</b>	<b>Amount</b>
1	Road Closure Traffic Control per City of Kalamazoo Traffic Specifications (see Maintaining Traffic stated herein)	1	LSUM	
2	Cut Remove/Replace and haul away asphalt road per City of Kalamazoo specifications approximately 25 feet long by 12 feet wide	1	LSUM	
3	Install new 6 inch sewer lead from existing 12 inch sanitary sewer main in Virginia Ave approximately 12 feet deep. Install approximately 40 LFT 6” SDR 35 to Prop line per City of Kalamazoo specifications	1	LSUM	
4	Final restoration of excavation limits not included in another pay item to match existing conditions	1	LSUM	
<b>TOTAL BID AMOUNT:</b>				<b>\$</b>

Work shall start within **10 working days** after receipt of notification by Contractor of Notice to Proceed, and final completion date on or before **August 28, 2026**.

If your quotation is not returned and completed on this form, it may be rejected.

Bidder shall provide all the information as requested herein with their quote. **Failure to do so and/or failure to provide post-bid requested information may be cause for rejecting the quote as non-responsive.**

Bidder/Contractor has examined and carefully studied the bidding documents and attachments, and acknowledges receipt of the following addenda:

Addendum No: \_\_\_\_\_

Dated: \_\_\_\_\_

The City encourages the use of local labor in fulfilling the requirements of this contract.

By my signature below, I certify that the firm bidding on this contract, when making hiring decisions, does not use a past criminal conviction as a bar to or preclude a person with a criminal conviction from being considered for employment with the bidding firm unless otherwise precluded by federal or state law. I further certify that I have read and agree to be bound by the provisions of the City's Non-Discrimination Clause found in Appendix A as updated by City Ordinance 1856.

Signed: \_\_\_\_\_ Name: \_\_\_\_\_

Title: \_\_\_\_\_

**BIDDERS QUESTIONNAIRE**

Please answer the following questions completely.

1. Firm name: \_\_\_\_\_
2. Established:           Year \_\_\_\_\_           No. of employees \_\_\_\_\_
3. Type of organization:
  - a. Individual: \_\_\_\_\_
  - b. Partnership: \_\_\_\_\_
  - c. Corporation: \_\_\_\_\_
  - d. Other: \_\_\_\_\_
4. Former firm name(s) if any, and year(s) in business:  
\_\_\_\_\_  
\_\_\_\_\_
5. Include at least 3 references of contracts for similar work performed over the last 5 years.
  - 5.1 Company Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
Contact: \_\_\_\_\_ Phone: \_\_\_\_\_  
Type of work or contract: \_\_\_\_\_
  - 5.2 Company Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
Contact: \_\_\_\_\_ Phone: \_\_\_\_\_  
Type of work or contract: \_\_\_\_\_
  - 5.3 Company Name: \_\_\_\_\_  
Address: \_\_\_\_\_  
Contact: \_\_\_\_\_ Phone: \_\_\_\_\_  
Type of work or contract: \_\_\_\_\_

**CITY OF KALAMAZOO**  
**LOCAL PREFERENCE POLICY AND CERTIFICATION**

The lowest responsive Kalamazoo County bidder whose bid is not low but falls within 2% of the lowest responsive bid is afforded the opportunity to become the successful bidder if it agrees to reduce its bid to match the lowest responsive bid. The City of Kalamazoo is the sole determiner whether a bidder is responsible, qualifies as a Kalamazoo County bidder, and if its bid is responsive to the City's specifications, terms, and conditions.

If the lowest Kalamazoo County bidder chooses not to match the lowest bid, the next lowest responsive Kalamazoo County bidder whose bid falls within 2% of the lowest bid, is given the opportunity to match the lowest responsive bid.

To qualify as a Kalamazoo County bidder, the bidder must meet both the following criteria:

1. Have a physical presence in Kalamazoo County by maintaining a permanent office, factory, or other facility in Kalamazoo County with employees working in Kalamazoo County.
2. Have paid real or personal property taxes related to said business to the City of Kalamazoo, County of Kalamazoo, or other municipal corporation within Kalamazoo County in the previous tax year, except that a non-profit entity need not meet this requirement.

This local preference policy applies only to purchases for materials, supplies, capital outlay, and services for maintenance, repair or operation of City facilities that are over \$25,000. If more than 50% of the contract is sub-contracted to firms located outside of Kalamazoo County that bid does not qualify for the local preference policy outlined above. The local preference policy will not apply if prohibited by law. The Purchasing Director has the authority to finally determine if the bidder qualifies as a Kalamazoo County bidder as set forth herein. The Purchasing Director may take into account the permanency of the business in Kalamazoo, and whether the business appears to be claiming to be a Kalamazoo County business solely or primarily to qualify as a Kalamazoo County business under this Resolution, and any other material factors.

**CERTIFICATION**

If you qualify as a Kalamazoo County bidder and wish to be considered for the local preference provisions as provided above, please certify that fact by providing the information requested below and attesting to its accuracy.

Firm Name: \_\_\_\_\_

Street Address of Business: \_\_\_\_\_

City, State, and Zip Code: \_\_\_\_\_

Number of employees working in Kalamazoo County: \_\_\_\_\_

Name the city or township to which business real and/or personal property taxes are paid or provide non-profit status: \_\_\_\_\_

The above information is accurate:

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

Title: \_\_\_\_\_

CITY OF KALAMAZOO EX-OFFENDER POLICY CHECKLIST

As part of the City's commitment to reducing unacceptable poverty, encouraging rehabilitation, reducing recidivism and strengthening families in Kalamazoo, the City has updated its Purchasing Policy to ensure that firms with whom the City does business share in this commitment by utilizing hiring practices that do not unfairly deny people with arrest and conviction records gainful employment. *(Important: This requirement also extends to any subcontractors the bidder intends to use to fulfill the contract for goods or services being sought from the City.)*

**Part I: Proof that the bidder does not inquire about an individual's past arrest or criminal history on the bidder's employment application form**

- Attach a copy of the current application for employment being used by the bidder.

**Part II: Certification that the bidder does not use an individual's past arrest or criminal history to unlawfully discriminate against them by checking *one or more* of the following:**

- That pursuant to federal or state law bidder is precluded from hiring persons with certain criminal records from holding particular positions or engaging in certain occupations by providing a cite to the applicable statute or regulation; if checking this box, provide a citation to the applicable statute or rule upon which the bidder is relying: \_\_\_\_\_
- That bidder conducts criminal history background checks only as necessary, and only after making a conditional offer of employment; that any withdrawal of an offer of employment to an individual because of a past criminal history is job-related and consistent with business necessity after the individual has been provided an individualized assessment opportunity to review and challenge or supplement the history of past criminal conduct being relied upon by the bidder.
- That the use by bidder of criminal history background checks complies with the U.S. Equal Employment Opportunity Commission's Enforcement Guidance on the Consideration of Arrest and Conviction Records in Employment Decisions and that the bidder has not had a determination rendered against it in past 7 years that it discriminated against a person through the use of an individual's arrest or criminal history

I CERTIFY THAT THE ABOVE STATEMENTS ARE TRUE.

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Position

I hereby state that all the information I have provided is true, accurate and complete. I hereby state that I have the authority to submit this bid which will become a binding contract if accepted by the City of Kalamazoo. I hereby state that I have not communicated with nor otherwise colluded with any other bidder, nor have I made any agreement with nor offered/accepted anything of value to/from an official or employee of the City of Kalamazoo that would tend to destroy or hinder free competition.

The firm's identification information provided will be used by the City for purchase orders, payment and other contractual purposes. If the contractual relationship is with, or the payment made to, another firm please provide a complete explanation on your letterhead and attach to your bid. Please provide for accounts payable purposes:

Tax Identification Number (Federal ID): \_\_\_\_\_

Remittance Address: \_\_\_\_\_

Financial Contact Name: \_\_\_\_\_ Financial Contact Phone Number: \_\_\_\_\_

Financial Contact Email Address: \_\_\_\_\_

I hereby state that I have read, understand, and agree to be bound by all terms and conditions of this bid document.

SIGNED: \_\_\_\_\_ NAME: \_\_\_\_\_  
(Type or Print)

TITLE: \_\_\_\_\_ DATE: \_\_\_\_\_

FIRM NAME: \_\_\_\_\_  
(If any)

ADDRESS: \_\_\_\_\_  
(Street address) (City) (State) (Zip)

PHONE: \_\_\_\_\_ EMAIL ADDRESS: \_\_\_\_\_

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**FOR CITY USE ONLY - DO NOT WRITE BELOW**

**CITY OF KALAMAZOO  
INDEMNITY AND INSURANCE**

Contractor, or any of their subcontractors, shall not commence work under this contract until they have obtained the insurance required under this paragraph, and shall keep such insurance in force during the entire life of this contract.

All coverage shall be with insurance companies licensed and admitted to do business in the State of Michigan and acceptable to the City of Kalamazoo within ten (10) days of the Notice of Award. The requirements below should not be interpreted to limit the liability of the Contractor. All deductibles and SIR's are the responsibility of the Contractor.

The Contractor shall procure and maintain the following insurance coverage:

Workers' Compensation Insurance including Employers' Liability Coverage, in accordance with all applicable statutes of the State of Michigan.

Commercial General Liability Insurance on an "Occurrence Basis" with limits of liability not less than \$1,000,000 per occurrence and aggregate. Coverage shall include the following extensions: (A) Contractual Liability; (B) Products and Completed Operations; (C) Independent Contractors Coverage; (D) Broad Form General Liability Extensions or equivalent, if not already included and (E) XCU coverage if the nature of the contract requires XC or U work.

Automobile Liability including Michigan No-Fault Coverages, with limits of liability not less than \$1,000,000 per occurrence, combined single limit for Bodily Injury, and Property Damage. Coverage shall include all owned vehicles, all non-owned vehicles, and all hired vehicles.

Additional Insured: Commercial General Liability and Automobile Liability, as described above, shall include an endorsement stating that the following shall be *Additional Insureds*: The City of Kalamazoo, all elected and appointed officials, all employees and volunteers, all boards, commissions, and/or authorities and board members, including employees and volunteers thereof. It is understood and agreed that by naming the City of Kalamazoo as additional insured, coverage afforded is considered to be primary and any other insurance the City of Kalamazoo may have in effect shall be considered secondary and/or excess.

To the fullest extent permitted by law the Contractor agrees to defend, pay on behalf of, indemnify, and hold harmless the City of Kalamazoo, its elected and appointed officials, employees, agents and volunteers, and others working on behalf of the City of Kalamazoo against any and all claims, demands, suits, or loss, including all costs connected therewith, and for any damages which may be asserted, claimed, or recovered against or from the City of Kalamazoo, by reason of personal injury, including bodily injury or death and/or property damage, including loss of use thereof, which arises out of, or is in any way connected or associated with this contract.

Cancellation Notice: All policies, as described above, shall include an endorsement stating that it is understood and agreed that thirty (30) days, or ten (10) days for non-payment of premium, Advance Written Notice of Cancellation, Non-Renewal, Reduction, and/or Material Change shall be sent to: City of Kalamazoo, Purchasing Department, 241 W. South Street, Kalamazoo, MI 49007.

Proof of Insurance Coverage: The Contractor shall provide the City of Kalamazoo at the time that the contracts are returned by him/her for execution, or within 10 days of Notice of Award, whichever is earlier, a Certificate of Insurance as well as the required endorsements. In lieu of required endorsements, if applicable, a copy of the policy sections where coverage is provided for additional insured and cancellation notice would be acceptable. Copies or certified copies of all policies mentioned above shall be furnished, if so requested.

**INDEMNITY AND INSURANCE**  
*Continued*

If any of the above coverages expire during the term of this contract, the Contractor shall deliver renewal certificates and/or policies to City of Kalamazoo at least ten (10) days prior to the expiration date.

Scope of Coverage: The above requirements and conditions shall not be interpreted to limit the liability of the Contractor under this Contract but shall be interpreted to provide the greatest benefit to the City and its officers and employees. The above listed coverages shall protect the Contractor, its employees, agents, representatives, and subcontractors against claims arising out of the work performed. It shall be the Contractor's responsibility to provide similar insurance for each subcontractor or to provide evidence that each subcontractor carries such insurance in like amount prior to the time such subcontractor proceeds to perform under the contract.

## **GENERAL PROVISIONS**

### **1. INTENT**

It is the intent of these specifications and drawings/plans to provide for a contractor who shall provide all labor, materials, tools, equipment, and services necessary to perform in a professional manner the *Virginia Ave Sanitary Lateral Install* as described in the specifications and bid document.

### **2. SCOPE OF WORK**

The scope of work involves work for the Virginia Ave Sanitary Lateral Install Project.  
Work shall include:

- 2.1 Road Closure Traffic Control per City of Kalamazoo Traffic Specifications (see Maintaining Traffic stated herein).
- 2.2 Cut Remove/Replace and haul away asphalt road per City of Kalamazoo specifications approximately 25 feet long by 12 feet wide.
- 2.3 Install new 6 inch sewer lead from existing 12 inch sanitary sewer main in Virginia Ave approximately 12 feet deep. Install approximately 40 LFT 6" SDR 35 to Prop line per City of Kalamazoo specifications.
- 2.4 Final restoration of excavation limits not included in another pay item to match existing conditions.
- 2.5 Location of project is at 2842 Virginia Ave, Kalamazoo, MI.
- 2.6 Requirements as shown in the attachments as stated herein.

### **3. QUANTITIES**

The quantities shown or indicated on the specifications are only estimated. Payment will be made based upon unit pricing of quantities installed.

### **4. UNIT PRICING**

The unit price, including its pro-rata share of overhead, multiplied by the quantity shown shall represent the total bid and shall be held firm for the life of this contract. Any bid not conforming to this requirement may be rejected as non-responsive.

### **5. INSPECTION OF WORK**

The City may maintain inspectors on the job who shall at all times have access to work.

### **6. INSPECTION OF SITE**

Each bidder shall visit the site of the proposed work and fully acquaint himself/herself with the existing conditions relating to construction and labor, and shall fully inform himself/herself as to the facilities involved and the difficulties and restrictions attending the performance of this contract. The bidder shall thoroughly examine and become familiar with the drawings, specifications and all other bid/contract documents. The Contractor, by the execution of this contract, shall in no way be relieved of any obligation under it due to his failure to receive or examine any form or legal instrument, or to visit the site and acquaint himself/herself with the conditions there existing. No allowance shall be made subsequently in this connection in behalf of the Contractor for any negligence of his/her part. For inspection call the Public Services Department, Water Department.

**7. INSPECTION AND TESTING**

The Contractor shall give the Project Manager timely notice of readiness of the work for all required inspections, tests or approvals, and shall cooperate with inspections and testing personnel to facilitate required inspections or tests. The City will provide for materials and construction testing including but not limited to compaction of subbase and backfill material, concrete testing and asphalt testing. The cost of said testing shall be borne by the City. Verification that testing required by the contract has been completed on one phase of the project prior to proceeding to the next phase is the responsibility of the Contractor. In the event that the project has proceeded without required testing, the Contractor shall insure that the required testing is obtained retroactively and shall provide access for testing as necessary at his/her sole expense.

**8. MATERIALS INSPECTION AND RESPONSIBILITY**

- 8.1 The Project Manager shall have the right to inspect any materials to be used in carrying out the terms of the contract.
- 8.2 The City does not assume any responsibility for the contracted quality and standard of all materials, equipment, components or completed work furnished under this contract.
- 8.3 Any materials, equipment, components or completed work which does not comply with contract specifications, MDOT, or State codes may be rejected by the City, and shall be replaced by the Contractor at no cost to the City.
- 8.4 Any materials, equipment or components rejected shall be removed within a reasonable period of time from the premises of the City at the entire expense of the Contractor after notice has been given by the City to the Contractor that such materials, equipment or components have been rejected.

**9. LAYING OUT WORK**

Before submitting a bid, the Contractor shall verify all measurements and shall be responsible for the correctness of same. No extra charge or compensation will be allowed on account of differences between actual dimensions and the measurements indicated on the drawings. Any difference that may be found shall be submitted to the Citywide Facilities Manager for consideration before proceeding. The Citywide Facilities Manager Engineer will provide direction as needed.

**10. SUPERVISION**

The Contractor shall employ an experienced superintendent or foreperson on the job at all times.

**11. SITE SECURITY**

The Contractor shall be responsible for job site security of all materials and tools provided by him/her and no claim for loss or damage will be considered by the City.

**12. TARDINESS**

Construction delays resulting from tardiness on the part of the Contractor will be reviewed by the City in the event of any request for contract extension by the Contractor.

**13. PROGRESS SCHEDULE**

- 13.1 Work shall start after receipt of notification by Contractor of Notice to Proceed and shall be completed by date listed on the Bid Schedule.
- 13.2 Work of a similar nature may be added to this contract if agreed to by the City and the Contractor. In the event that work is added, the progress schedule for the work will remain unchanged. Any contract time added for additional work will be applied to that additional work only and cannot be added to items in the original contract. Any work done on the items in the original contract past the number of working days stated herein will be subject to liquidated damages regardless of any work that may be added at a later date.
- 13.3 The Contractor will be required to meet with the city representatives to work out detailed progress schedule. The schedule for this meeting will be within two weeks after contract award has been made.
- 13.4 The named sub-contractor(s) for all items shall also be present at the scheduled meeting and they will be required to sign the Progress Schedule to indicate their approval of the scheduled dates of work set forth in the Progress Schedule.
- 13.5 The Progress Schedule shall include, as a minimum, the starting and completion dates for major items, and where specified in the bid document the date the project is to be opened to traffic as well as the final project completion date specified in the bid documents. The Progress Schedule shall be coordinated with all aspects of the work occurring at the site.
- 13.6 Failure on the part of the Contractor to carry out the provisions of the Progress Schedule as established may be considered sufficient cause to prevent bidding future projects until a satisfactory rate of progress is again established.
- 13.7 The starting date and the contract time to the completion date for this project may be adjusted by city without imposing liquidated damages upon the receipt of satisfactory documented evidence that unforeseen delayed delivery of critical materials will prevent the orderly prosecution of the work.

**14. CONSTRUCTION SCHEDULE AND COORDINATION**

- 14.1 The Contractor shall supply the City with an agreeable construction schedule before commencing work on this contract. This schedule shall detail beginning and completion dates for each major component of the project.
- 14.2 The Contractor shall coordinate and cooperate with all other contractors who may be working on the site in order to allow for the orderly progress of work being done.
- 14.3 The Contractor is required to keep the Project Manager fully informed of any proposed work which will tend to interfere with the existing operations at the site.
- 14.4 The Contractor shall schedule all work to accommodate the City's schedule. In the event Contractor's schedule falls on weekends, nights or overtime work is required, no additional compensation will be allowed. All work shall be part of this contract without regard to when it is done.

**15. CONTRACTOR COORDINATION**

- 15.1 The Contractor shall make every effort to coordinate every aspect of his work with that of other contractors on the site to assure an efficiently managed and proper installation.
- 15.2 Consideration shall be given to timing of construction, maintaining adequate construction access, and construction staging. Any costs associated with this coordination shall be included in the contract.

**16. ADDITIONS**

- 16.1 Any modification to the contract shall be subject to prior approval by the Purchasing Agent. City Commission approval may also be required.
- 16.2 Prices for additional work required are not requested in the itemized listing contained herein for the base project. Should additional work be authorized, compensation shall be made on the basis of price or prices to be mutually agreed upon. Such additional work shall not begin until a Change Order has been approved.

**17. REMOVAL OF RUBBISH**

The Contractor shall daily remove all rubbish and accumulated materials due to his/her construction.

**18. SITE ACCESS**

The City will provide fair and reasonable access to the job site within the working schedules of both parties.

**19. GUARANTEE**

The Contractor shall guarantee all of his/her work for a period of one (1) year following the date of final acceptance of the completed work and shall repair, replace or make good any materials or work which fail to function or perform or be found defective, without cost to the City.

**20. SAFETY**

The Contractor shall comply with all applicable OSHA and MIOSHA regulations.

**21. PAY ESTIMATES**

The Contractor shall be responsible for the generation of invoices for payment. Contractors shall use One-Drive Project Spreadsheet. Payment will be generated by the City based upon an approved invoice. Recommended frequency of payment is monthly, however, frequency of payment will not exceed bi-weekly.

**22. PRODUCT/SYSTEM SUBSTITUTIONS**

Submit a written request, to be received not later than 10 days prior to scheduled bid opening, for Substitution of any Product not named. If no substitutions are submitted, it will be reasonably concluded by the Owner that the specified product will be incorporated into the Work and the Bidder will be committed to supplying the specified product.

- 22.1 Describe in detail any variance to the specified product. All proposed substitution for specified items shall be substantially the same size (height, length, width, diameter, etc.), type, color, construction quality and shall meet the design intent to be considered for substitution for the Product specified.

**PRODUCT/SYSTEM SUBSTITUTIONS (Cont.)**

- 22.2 Document each request with complete data substantiating compliance of proposed Substitution with Product specified including written certification that Product conforms to or exceeds all requirements of the Product specified.
- 22.3 Document all coordination information, including a list of changes or modifications needed to the Contract Documents or other parts of the Work and to construction performed by the Owner and Separate Contractors that will become necessary to accommodate the proposed substitution.
- 22.4 Provide name, address and telephone number of manufacturer's authorized representative.
- 22.5 Submit three copies of all documents for each request for Substitution for consideration.
- 22.6 Approval of the Substitution request, if given, will be in the form of an addendum issued prior to scheduled opening date and hour at local time.

**23. SAMPLES AND DEMONSTRATIONS**

Evidence in the form of samples may be requested. Such samples are to be furnished after the date of bid opening only upon request of The City unless otherwise stated in the bid proposal. If samples should be requested, such samples must be received by The City no later than seven (7) days after formal request is made. When required, The City may request full demonstrations of any unit(s) bid prior to the award of any contract. Samples, when requested, must be furnished free of expense to The City and if not used in testing or destroyed, will upon request within thirty (30) days of bid award be returned at the bidder's request.

**24. ACCEPTANCE OF MATERIAL**

The material delivered under this proposal shall remain the property of the seller until a physical inspection and actual usage of the material and/or services is made and thereafter accepted to the satisfaction of The City and must comply with the terms herein and be full in accord with specifications and of the highest quality. In the event the material and/or service supplied to The City is found to be defective or does not conform to specifications, The City reserves the right to cancel the order upon written notice to the seller and return the product to seller at the seller's expense.

**25. VARIATIONS TO SPECIFICATIONS**

For purposes of evaluation, the bidder **MUST** indicate any variances from our specifications, terms and/or conditions, no matter how slight. If variations are not stated in the proposal, it will be assumed that the product or service fully complies with our specifications, terms and conditions.

**26. SAFETY STANDARDS**

The bidder warrants that the products supplied to The City conform in all respects to the standards set forth in the Occupational Safety and Health Act of 1970 and its amendments and the failure to comply with this condition will be considered a breach of contract.

**27. MANUFACTURER'S CERTIFICATION**

The City reserves the right to request from bidders separate manufacturer certification of all statements made in the bid.

**28. PROTECTION OF WORK**

The Contractor shall maintain adequate protection of all his/her work from damage and shall protect all public and private abutting property from injury or loss arising in connection with this contract.

**29. PROTECTION OF PROPERTY**

29.1 The Contractor shall confine his/her equipment and operations to those areas of the work site necessary for the completion of the work, or as authorized by the Project Manager. The Contractor shall protect and preserve from damage any facilities, utilities or features including trees, shrubs and turf which are not required to be disturbed by the requirements of the work.

29.2 The Contractor shall be responsible to determine the location of and to protect from damage any utilities or other improvements.

**30. WORK HOURS**

All work shall be done between the hours of 6:30 a.m. to 5:00 p.m. (Monday – Friday). Work done outside of these times will be at the discretion of the Project Manager.

No work shall be done on Saturday or Sunday, unless otherwise approved by the Project Manager in writing.

No work shall be done on City Holidays, unless otherwise approved by the Project Manager in writing.

The Contractor shall conduct their work in such a manner that no excavations are left open overnight. If this is not possible, the Contractor shall provide and install a temporary fence to protect the excavation at the Contractor's expense.

**31. PROJECT MANAGER'S STATUS**

The City Engineer (Engineer) or his/her duly authorized representative shall be the City's Project Manager and shall have the duties and responsibilities as provided in the contract.

The Project Manager shall have the authority to reject any work or materials which do not conform to the contract and to decide questions or interpretations which may arise from the contract documents.

The Contractor shall immediately report to the Project Manager any questionable or obvious error or omission which may be apparent in the contract documents and shall not proceed with work until the Project Manager has resolved the error or omission.

32. **MAINTAINING TRAFFIC**

32.1 This work shall be in accordance with the requirements of Section 812 of the MDOT Standard Specifications for Construction and as specified herein. The Contractor is advised that the current Michigan Manual of Uniform Traffic Control Devices is hereby established as governing all work in connection with traffic control devices, barricade lighting, etc. required on this project.

32.2 The Contractor shall furnish, erect, maintain and, upon completion of the work, remove all traffic control devices and barricade lights within the project and around the perimeter of the project for the safety and protection of through and local traffic. This includes, but is not limited to: Advance, regulatory and warning signs; barricades and channeling devices at intersecting streets on which traffic is to be maintained; barricades at the ends of the project and at right of way lines for intersecting streets which are to be closed with the first usable street on each side of the project. Traffic regulators, where required by the Engineer, are included.

32.3 Where the existing pavement or partial widths of new pavement are to be utilized for the maintenance of through and local traffic, drum type barricades will be required at 50' intervals or as directed by the Engineer for channeling and directing traffic through the construction area.

32.4 Through traffic shall be maintained utilizing sidewalk closures with detours and traffic shifts per MDOT traffic and safety details.

32.5 Protection of all pedestrian traffic shall be maintained at all times.

32.6 Payment for the traffic control devices shall be based on the contract lump sum price.

32.7 Under Article 812.04.D "Operated Pay Items" the term 'Relocating' shall include the relocating of the item from any street covered by the contract to any other street covered by the contract.

**Special Restrictions:** Access to frontage properties shall be maintained as much as practical. Emergency access shall be maintained at all times. The Contractor shall maintain two way traffic with flag control as needed when the road is restricted to only one traffic lane.

33. **LIQUIDATED DAMAGES**

33.1 Liquidated damages, if applicable, shall be \$500.00 a day regardless of contract size.

33.2 The provisions of Article 108.11B of the MDOT 2003 Standard Specifications for Construction for reducing liquidated damages of 50 percent of the amount indicated in Table 108-1 of article 108.11C for projects where traffic is maintained during construction will not apply.

34. **QUESTIONS**

Bidders shall address questions regarding the specifications to Ethan Ray, Civil Engineer at [raye@kalamazoocity.org](mailto:raye@kalamazoocity.org) (This does not relieve the requirements of Page 1, Item 3). Questions regarding terms, conditions and other related bid requirements may be addressed to Scott Shaffer, Buyer at [shaffers@kalamazoocity.org](mailto:shaffers@kalamazoocity.org).

## TERMS AND CONDITIONS

### 1. AWARD OF CONTRACT

- A. This contract will be awarded to that responsible bidder whose bid, conforming to this solicitation, will be most advantageous to the City, price and other factors considered. The City reserves the right to accept or reject any or all bids and waive informalities and minor irregularities in bids received. Other factors include, as an example but not limited to, delivery time, conformance to specifications, incidental costs such as demurrage and deposits, etc.

Notification of award will be in writing by the Purchasing Agent. Upon notification, the Contractor shall submit to the Purchasing Division all required insurance certificates (if required) and such other documentation as may be requested or required hereunder. Upon their receipt and subsequent approval by the City, the Purchasing Agent will forward to the Contractor a written **NOTICE TO PROCEED**. Work shall **NOT** be started until such **NOTICE TO PROCEED** is received by the Contractor.

- B. Unilateral changes in bid prices by the bidder shall not be allowed. However, the City, at its sole option, reserves the right to negotiate with bidders in the event of, but not limited to:

- 1) No bids received;
- 2) A single bid being received; or
- 3) Prices quoted are over budget and/or unreasonable.

### 2. COMPLETE CONTRACT

This bid document together with its addenda, amendments, attachments and modifications, when executed, becomes the complete contract between the parties hereto, and no verbal or oral promises or representations made in conjunction with the negotiation of this contract shall be binding on either party.

### 3. SUBCONTRACTORS – NON-ASSIGNMENT

Bidders shall state in writing any and all sub-contractors to be associated with this bid, including the type of work to be performed. The Contractor shall cooperate with the City of Kalamazoo in meeting its commitments and goals with regard to maximum utilization of minority and women-owned business enterprises.

The Contractor hereby agrees and understands that the contract resulting from this solicitation shall not be transferred, assigned or sublet without prior written consent of the City of Kalamazoo.

### 4. TAXES

The City of Kalamazoo is exempt from all federal excise tax and state sales and use taxes.

### 5. INVOICING

**All original invoice(s) will be sent to the Financial Services Division, 241 W. South Street, Kalamazoo, MI 49007 or via email at [apinvoice@kalamazoo.org](mailto:apinvoice@kalamazoo.org).** The Finance Division processes payments after receipt of an original invoice from the Contractor and approval by the department. The City of Kalamazoo's policy is to pay invoice(s) within 30 days from the receipt of the original invoice, if the services or supplies are satisfactory and the proper paperwork and procedures have been followed. **In order to guarantee payment to the vendor on a timely basis, the vendor needs to receive a purchase order number before supplying the City of Kalamazoo with goods or services.** All original, and copies of original invoice(s), will clearly state which purchase order they are being billed against.

**INVOICING (Cont.)**

**The City of Kalamazoo is a government municipality and therefore is tax exempt from all sales tax.**

**The vendor is responsible for supplying the Finance Division with a copy of their W9 if they are providing a service to the City of Kalamazoo.**

**6. PAYMENTS**

Upon issuance of certificates of Payment by the Architect/Engineer for labor and material incorporated in the work and the materials suitably stored at the site payment shall be made up to ninety (90%) percent of the value thereof.

When the cumulative total of payment is equal to fifty (50%) percent of the contract sum, subsequent payments will be made in the full amount for labor and material certified by the Architect/Engineer.

The amount retained shall be held until final acceptance of the work, receipt of all payrolls, releases, and waiver of liens.

**7. CHANGES AND/OR CONTRACT MODIFICATIONS**

The City reserves the right to increase or decrease quantities, service or requirements, or make any changes necessary at any time during the term of this contract, or any negotiated extension thereof. Price adjustments due to any of the foregoing changes shall be negotiated and mutually agreed upon by the Contractor and the City.

Changes of any nature after contract award which reflect an increase or decrease in requirements or costs shall not be permitted without prior approval by the Purchasing Agent. City Commission approval may also be required.

**ANY CHANGES PERFORMED IN ADVANCE OF PURCHASING AGENT APPROVAL, MAY BE SUBJECT TO DENIAL AND NON-PAYMENT.**

**8. LAWS, ORDINANCES AND REGULATIONS**

The Contractor shall keep himself/herself fully informed of all local, state and federal laws, ordinances and regulations in any manner affecting those engaged or employed in the work and the equipment used. Contractor and/or employees shall, at all times, serve and comply with such laws, ordinances and regulations.

Any permits, licenses, certificates or fees required for the performance of the work shall be obtained and paid for by the Contractor.

This contract shall be governed by the laws of the State of Michigan.

**9. RIGHT TO AUDIT**

The City or its designee shall be entitled to audit all of the Contractor's records, and shall be allowed to interview any of the Contractor's employees, throughout the term of this contract and for a period of three years after final payment or longer if required by law to the extent necessary to adequately permit evaluation and verification of:

- A. Contractor compliance with contract requirements,
- B. Compliance with provisions for pricing change orders, invoices or claims submitted by the Contractor or any of his payees.

10. **HOLD HARMLESS**

If the negligent acts or omissions of the Contractor/Vendor or its employees, agents or officers, cause injury to person or property, the Contractor/Vendor shall indemnify and save harmless the City of Kalamazoo, its agents, officials, and employees against all claims, judgments, losses, damages, demands, and payments of any kind to persons or property to the extent occasioned from any claim or demand arising therefrom.

11. **DEFAULT**

The City may at any time, by written notice to the Contractor, terminate this contract and the Contractor's right to proceed with the work, for just cause, which shall include, but is not limited to the following:

- A. Failure to provide insurance and bonds (when called for), in the exact amounts and within the time specified or any extension thereof.
- B. Failure to make delivery of the supplies, or to perform the services within the time specified herein, or any extension thereof.
- C. The unauthorized substitution of articles for those bid and specified.
- D. Failure to make progress if such failure endangers performance of the contract in accordance with its terms.
- E. Failure to perform in compliance with any provision of the contract.
- F. **Standard of Performance** - Contractor guarantees the performance of the commodities, goods or services rendered herein in accordance with the accepted standards of the industry or industries concerned herein, except that if this specification calls for higher standards, then such higher standards shall be provided.

Upon notice by the City of Contractor's failure to comply with such standards or to otherwise be in default of this contract in any manner following the Notice to Proceed, Contractor shall immediately remedy said defective performance in a manner acceptable to the City. Should Contractor fail to immediately correct said defective performance, said failure shall be considered a breach of this contract and grounds for termination of the same by the City.

In the event of any breach of this contract by Contractor, Contractor shall pay any cost to the City caused by said breach including but not limited to the replacement cost of such goods or services with another Contractor.

The City reserves the right to withhold any or all payments until any defects in performance have been satisfactorily corrected.

In the event the Contractor is in breach of this contract in any manner, and such breach has not been satisfactorily corrected, the City may bar the Contractor from being awarded any future City contracts.

- G. All remedies available to the City herein are cumulative and the election of one remedy by the City shall not be a waiver of any other remedy available to the City.

**12. TERMINATION OF CONTRACT**

The City may, at any time and without cause, suspend the work of this contract for a period of not more than ninety days after providing notice in writing to the Contractor. The Contractor shall be allowed an adjustment in the contract price or an extension of the contract times, or both, directly attributable to the suspension if Contractor makes an approved claim.

The City may, without prejudice to any other right or remedy of the City, and with or without cause, terminate the contract by giving seven days written notice to the Contractor. In such case the Contractor shall be paid, without duplication, for the following items:

- A. Completed and acceptable work executed in accordance with the contract documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such work;
- B. Expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials or equipment as required by the contract documents in connection with uncompleted work, plus fair and reasonable sums for overhead and profit on such expenses;
- C. All documented claims, costs, losses and damages incurred in settlement of terminated contracts with Subcontractors, Suppliers and others; and
- D. Reasonable expenses directly attributable to termination.

The Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

**13. INDEPENDENT CONTRACTOR**

At all times, the Contractor, any of his/her employees, or his/her sub-contractors and their subsequent employees shall be considered independent contractors and not as City employees. The Contractor shall exercise all supervisory control and general control over all workers' duties, payment of wages to Contractor's employees and the right to hire, fire and discipline their employees and workers. As an independent contractor, payment under this contract shall not be subject to any withholding for tax, social security or other purposes, nor shall the Contractor or his/her employees be entitled to sick leave, pension benefit, vacation, medical benefits, life insurance or workers' unemployment compensation or the like.

**14. PROJECT SUPERVISOR**

The Contractor shall employ an individual to act as Project Supervisor. The Project Supervisor shall be available to the Contractor's workers and the Project Manager at all times by use of a beeper or other reliable means. The Project Supervisor shall prepare daily work plans for the employees, monitor employee performance, attendance and punctuality; and work closely with the City's Project Manager in assuring contract compliance.

**15. MEETINGS**

The Contractor and/or Project Supervisor shall be available to meet with the Department Head or Project Manager at a mutually agreeable time to discuss problems, issues or concerns relative to the contract. Either party may call a meeting at any time. When such a request for a meeting is made, the meeting date shall, in no case exceed five (5) working days after the request; and, if in the sole opinion of the Department Head, the severity of the circumstance warrants, no more than one (1) working day.

**16. INSPECTION OF WORK SITE**

Before submitting bids or quotes for work, the Contractor shall be responsible for examining the work site and satisfying himself/herself as to the existing conditions under which he/she will be obligated to operate, or that in any way affects the work under this contract. No allowance shall be made subsequently, on behalf of the Contractor, for any negligence on his/her part.

**17. CONTRACT PERIOD, EXTENSIONS, CANCELLATION**

- A. The contract shall be in effect for the term stated in the specifications.
- B. The City may opt to extend this contract upon mutual agreement of both parties. The number of extensions shall be limited to that stated in the specifications.
- C. The City may, from time to time, find it necessary to continue this contract on a month-to-month basis only, not to exceed a six (6) month period. Such month-to-month extended periods shall be by mutual agreement of both parties, with all provisions of the original contract or any extension thereof remaining in full force and effect.
- D. All contracts, extensions and cost increases are subject to availability of funds and the approval of the City Commission (if required).
- E. The City reserves the right to cancel the contract due to non-appropriation of funds by the City with thirty (30) days written notice.
- F. Either party may terminate the contract (or any extension thereof) without cause at the end of any twelve (12) month term by giving written notice of such intent at least 60 days prior to the end of said twelve (12) month term.
- G. All notices are in effect commencing with the date of mailing. Written notices may be delivered in person or sent by First Class mail or emailed to the last known address.
- H. If cancellation is for default of contract due to non-performance, the contract may be canceled at any time (see Item 11, DEFAULT)

**APPENDIX A**  
**NON-DISCRIMINATION CLAUSE FOR ALL CITY OF KALAMAZOO CONTRACTS**

The Contractor agrees to comply with the Federal Civil Rights Act of 1964 as amended; the Federal Civil Rights Act of 1991 as amended; the Americans With Disabilities Act of 1990 as amended; the Elliott-Larson Civil Rights Act, Act. No. 453, Public Act of 1976 as amended; the Michigan Handicappers Civil Rights Act, Act No. 220, Public Act of 1976 as amended, City Ordinance 1856 and all other applicable Federal and State laws. The Contractor agrees as follows:

1. The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, national origin, sex, age, height, weight, marital status, physical or mental disability, family status, sexual orientation or gender identity that is unrelated to the individual's ability to perform the duties of the particular job or position. Such action shall include, but not be limited to the following: employment, upgrading, demotion or transfer, recruitment advertising, layoff or termination; rates of pay or other forms of compensations; and selection for training, including apprenticeship.
2. The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, national origin, sex, age, height, weight, marital status, physical or mental disability family status, sexual orientation or gender identity that is unrelated to the individuals ability to perform the duties of the particular job or position.
3. If requested by the City, the Contractor shall furnish information regarding practices, policies and programs and employment statistics for the Contractor and subcontractors. The Contractor and subcontractors shall permit access to all books, records and accounts regarding employment practices by agents and representatives of the City duly charged with investigative duties to assure compliance with this clause.
4. Breach of the covenants herein may be regarded as a material breach of the contract or purchasing agreement as provided in the Elliott-Larsen Civil Rights Act and City Ordinance 1856.
5. The Contractor will include or incorporate by reference the provisions of the foregoing paragraphs 1 through 4 in every subcontract or purchase order unless exempted by the rules, regulations or orders of the Michigan Civil Rights Commission\* and will provide in every subcontract or purchase order that said provision will be binding upon each subcontractor or seller.
6. The Contractor will not preclude a person with a criminal conviction from being considered for employment unless otherwise precluded by federal or state law. (For contracts over \$25,000)

The Elliott-Larson Civil Rights Act, Sec. 202 of Act. No. 453 of 1976 reads in part as follows:

Sec. 202. (1) An employer shall not:

- (a) Fail or refuse to hire, or recruit, or discharge or otherwise discriminate against an individual with respect to employment, compensation, or a term condition or privilege of employment because of religion, race, color, national origin, age, sex, height, weight or marital status.
- (b) Limit, segregate or classify an employee or applicant for employment in a way which deprives or tends to deprive the employee or applicant of an employment opportunity or otherwise adversely affects the status of an employee or applicant because of religion, race, color, national origin, age, sex, height, weight or marital status.
- (c) Segregate, classify, or otherwise discriminate against a person on the basis of sex with respect to a term, condition or privilege of employment, including a benefit plan or system.

\* Except for contracts entered into with parties employing less than three employees.



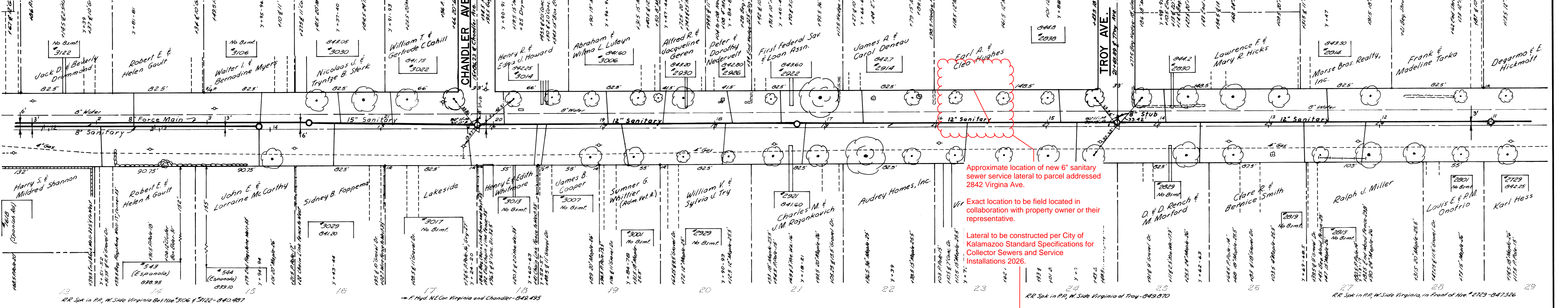
*2842 Virginia Avenue*

**Virginia Ave Sanitary Lateral Install**

**Bid Reference #: 91345-005.0**

**May 2026**

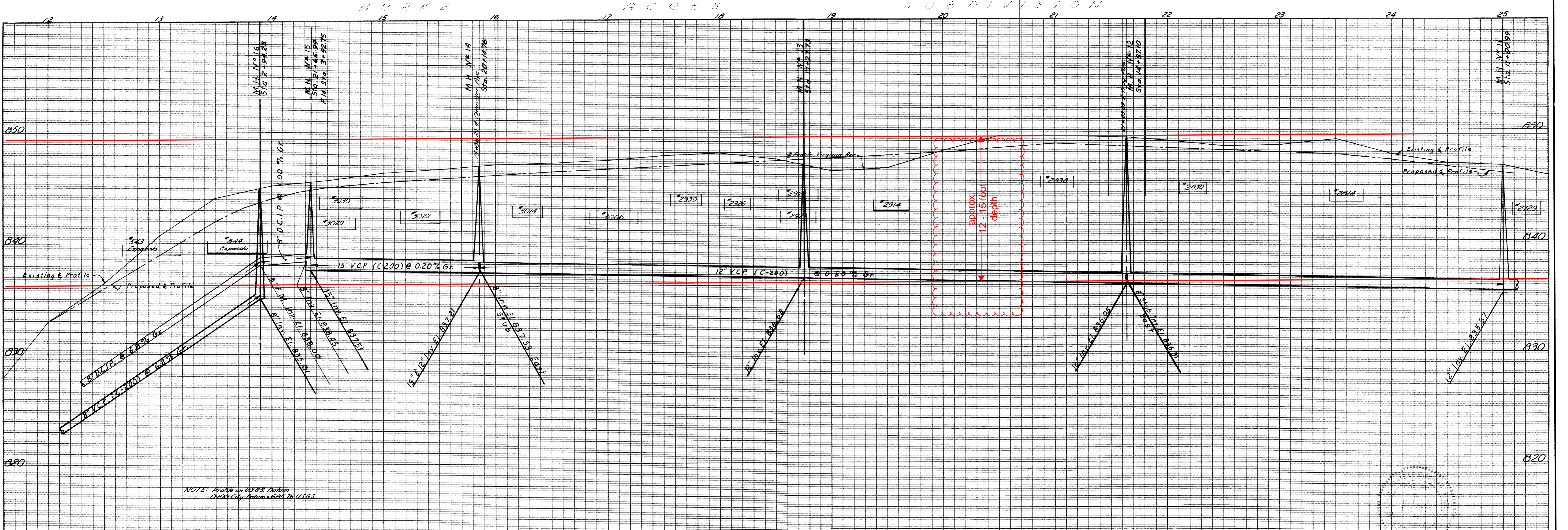
- Notes:
- 1) Contractor shall maintain operation of the existing sanitary sewer system network during construction
  - 2) Existing utilities shown on the drawing are for reference only. Contractor shall work around and maintaining all utilities shown and/or not shown on this record drawing.
  - 3) Identified hard- & soft-scapes shown on this record drawing is for reference only.
  - 4) Contractor shall complete and submit to Wastewater Engineering staff a completed As-Built Lateral Card prior to approval of payment by the Division.



Approximate location of new 6" sanitary sewer service lateral to parcel addressed 2842 Virginia Ave.

Exact location to be field located in collaboration with property owner or their representative.

Lateral to be constructed per City of Kalamazoo Standard Specifications for Collector Sewers and Service Installations 2026.



NOTE: Profile on U.S.G.S Datum  
City Datum = 685.76 USGS



*As-Built Lateral Card*

**Virginia Ave Sanitary Lateral Install**

**Bid Reference #: 91345-005.0**

**May 2026**

# SANTARY LEAD CONNECTION

PLAN

Installation Date: \_\_\_\_\_ #: \_\_\_\_\_

Number: \_\_\_\_\_ Street: \_\_\_\_\_

Y \_\_\_\_\_ Sta. @ Y \_\_\_\_\_ Sta. @ PL \_\_\_\_\_

Elevation @ WYE \_\_\_\_\_

Elevation @ PL \_\_\_\_\_

Depth @ WYE \_\_\_\_\_ Depth @ PL \_\_\_\_\_

House Ties: \_\_\_\_\_

Clean Out: \_\_\_\_\_ " Dimensions: \_\_\_\_\_

Size: \_\_\_\_\_ Material: \_\_\_\_\_

Lead Length: \_\_\_\_\_

Horz Length: \_\_\_\_\_ Riser Length: \_\_\_\_\_

Riser Depth: \_\_\_\_\_

Employee: \_\_\_\_\_

---

PROFILE



***COK Sanitary Sewer Specifications 2026***

**Virginia Ave Sanitary Lateral Install**

**Bid Reference #: 91345-005.0**

**May 2026**

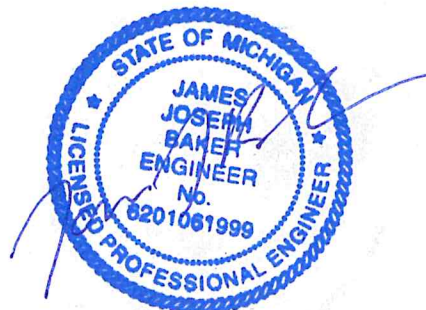
**CITY OF KALAMAZOO  
DEPARTMENT OF PUBLIC SERVICES**

**WASTEWATER DIVISION**



**PUBLIC SERVICES DEPARTMENT**  
WASTEWATER DIVISION  
1415 N. HARRISON ST.  
KALAMAZOO, MI 49007  
PHONE: 269-337-8736  
FAX: 269-337-8551

**STANDARD SPECIFICATIONS FOR  
COLLECTOR SEWERS AND SERVICE INSTALLATIONS  
2026**



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APPROVAL	
CITY OF KALAMAZOO, MICHIGAN	
JAMES J. BAKER, PE PUBLIC SERVICES DIRECTOR & CITY ENGINEER	2-10-26 DATE

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# **SPECIFICATIONS FOR SANITARY SEWER**

## **PART 1 GENERAL**

### **1.01 DESCRIPTION OF WORK**

This section includes furnishing and installing sanitary sewer (gravity and force main) pipe of the specified sizes in a trench and includes the construction of manholes, lateral connections to adjacent properties, valves, air release valves and other appurtenant work, including excavating, trenching and backfilling, and surface restoration. The work also includes the necessary clearing, sheeting and shoring, boring and jacking, dewatering, pipe embedment, and other appurtenant work.

The work must be performed in accordance with the drawings and the MDOT 2020 Standard Specifications for Construction.

Codes and standards referenced in the following specifications must be the current code or standard in effect at the time proposals are received.

### **1.02 SUBMITTALS**

A. Submittals shall be the responsibility of the Contractor:

1. Shop Drawings for Review:
  - a. Manufacturer's Shop Drawings indicating physical dimensions, and joint details for each size, type, and class of pipe, fittings and specials furnished for the project.
2. Information for the Record:
  - a. Manufacturer's certification indicating that the pipe and joints meet specifications for each production run for each size, type, and class of pipe furnished. The Engineer may request test results to verify certification. Certification documents must be according to the Source Quality Control of this Section.
  - b. Manufacturer's installation instructions.
  - c. The laboratory must submit test certifications of pipe ordered tested under "Field Quality Control", of this Section.
3. Engineer may request additional Shop Drawings or Information for the Record as required.
4. Requests for approved equals must be submitted to the Engineer for review a minimum of two (2) weeks prior to bid.

### **1.03 AS CONSTRUCTED RECORD**

A. During construction the Contractor must be required to keep current a set of "as constructed" drawings. Before final payment can be made, the Contractor must submit for approval to the City of Kalamazoo the complete set of as constructed drawings. Each set of "as constructed" drawings must be labeled "As Constructed", dates, and contain at a minimum the following information (additional information may be required by the City of Kalamazoo):

**Structures:**

1. Rim Elevations
2. Diameter
3. Pipe Sizes  
Orientation &  
Invert Elevations
4. Depth of Structure

**Pipes:**

1. Diameter
2. Length
3. Material
4. Slope

**Laterals:**

1. Address
2. Wye Station
3. Wye Elevation
4. Property Line Elevation
5. Wye Depth
6. Cleanout Depth
7. Diameter
8. Lead Length
9. Riser Height
10. Distance from DS MH
11. Tie downs of CO and  
horizontal bends

**PART 2 MATERIALS**

All materials furnished by the Contractor must conform to the following specifications. Contractor must provide certified affidavits of compliance and/or manufacturer strength test reports to the Engineer upon request.

**GRAVITY SEWER****2.01 SEWER PIPE**

All sewer pipe must be of the materials and strengths shown on the Drawings or as specified below.

**A. Polyvinyl Chloride (PVC) Solid Wall Pipe**

PVC solid-wall pipe less than 18 inches in diameter must conform to the requirements of ASTM D3034, with a minimum wall thickness equal to a standard dimension ratio of 35 (SDR-35).

PVC solid-wall pipe 18 inches in diameter and larger must conform to the requirements of ASTM F679, with a minimum pipe stiffness of 46 psi (PS-46).

Installations over 18 feet deep, based on the average depth of the manholes for each section of pipe, must utilize SDR-26 or PS-115 pipe.

Pipe must be made of PVC compound having a cell classification of 12454 or 12364 in accordance with ASTM D1784.

**B. PVC Composite (Truss Pipe)**

PVC Truss Pipe must conform to the requirements of ASTM D2680.

The PVC compound used in the Truss pipe must have a minimum cell classification of 12454 in accordance with ASTM D1784.

**C. Profile PVC Pipe**

Profile PVC pipe may be used only when specifically approved by the Owner and Engineer.

Profile PVC pipe must conform to the requirements of ASTM F794 and F949 for dual wall corrugated profile pipe, and ASTM F1803 for closed profile pipe.

Pipe must have a minimum pipe stiffness of 46 psi (PS-46).

Pipe must be made of PVC compound having a cell classification of 12454 or 12364 in accordance with ASTM D1784.

D. PVC Pipe Joints

Joints must be flexible elastomeric sealed type joint in accordance with ASTM D3212.

Gasket materials must meet requirements of ASTM F477.

Joint lubricant must be supplied and/or approved by the pipe manufacturer and must have no detrimental effect on the gasket or pipe.

## 2.02 SEWER FITTINGS

Fittings must be cast of the same material as the main sewer or may be an approved fabricated special fitting. Fitting joints must meet the same standards as the adjoining sewer.

Fittings must be manufactured and supplied in accordance with ASTM D3034 or ASTM F679. PVC molded and fabricated fittings may be supplied in accordance with ASTM F1336. Fittings must be heavy wall SDR 26, unless otherwise specified. Pipe used in fabricated fittings must have a wall thickness equal to or greater than the wall thickness of the pipes to which the fitting will be joined.

A. Wyes and Tees

Details of special fittings and/or adapters for connecting laterals of a material different from the main sewer must be approved by the Engineer before they are manufactured. Fabricated special fittings must provide a suitable connection for the lateral to the main sewer.

Wyes and Tees will be required as follows:

6" Wyes on main sewer of up to 24" diameter

6" Inserta-Tee, Kor-N-Tee, or approved equal, on main sewer of 24" diameter or larger.

B. Couplings

Couplings used to connect new and existing sanitary sewer piping must be gasketed solid sleeve PVC couplings where possible. PVC couplings must meet sewer fittings specification herein.

Where solid sleeve PVC couplings cannot be utilized, flexible transition couplings in accordance with ASTM C1173 and ASTM D5926 may be utilized, subject to Engineer approval.

Flexible transition couplings must be appropriately sized for the connecting materials and must include stainless steel clamp bands and an external stainless steel shear ring with a minimum thickness of 0.012". Coupling must be Fernco Strong Back RC Couplings, Indiana Seal Couplings with Amazon Shear Rings, or Engineer approved equal.

## 2.03 SANITARY SEWER LATERALS

### A. Lateral Piping

Sewer lateral piping must be PVC solid-wall pipe conforming to the requirements of ASTM D3034, with a standard dimension ratio of 26 (SDR-26).

PVC pipe joints and PVC compound must meet the sanitary sewer pipe material specification herein.

### B. Lateral Fittings

Sewer lateral fittings must be manufactured and supplied in accordance with ASTM D3034. Molded and fabricated fittings may be supplied in accordance with ASTM F1336. Fittings must be heavy wall SDR 26, unless otherwise specified. Pipe used in fabricated fittings must have a wall thickness equal to or greater than the wall thickness of the pipes to which the fitting will be joined.

Any specified bends must be smooth, long-radius type curves. No mitered or segmental type bends will be approved.

Joints must be flexible elastomeric sealed type joint in accordance with ASTM D3212. Gasket materials must meet requirements of ASTM F477 or ASTM F913.

Fittings must be made of PVC compound having a cell classification of 12454 or 13343 in accordance with ASTM D1784.

### C. Lateral Couplings

Lateral couplings must meet the requirements for sanitary sewer pipe couplings.

### D. Lateral Plugs

Plugs, stoppers, or glued caps for plugging the ends of laterals or risers which are not extended must make a watertight seal and be of such a design that they can be readily removed without damage to the pipe.

## 2.04 CEMENT MORTAR

Mortar must consist of one part Portland Limestone Cement and two parts masonry sand. These proportions must be measured by volume.

The sand and cement must be mixed dry in a clean tight box until a mixture of uniform color is produced, after which water must be added until the required consistency is obtained. Mortar must be mixed only in such quantities as needed for immediate use. The retempering of mortar will not be permitted.

### A. Cement

Portland Limestone Cement must conform to the requirements for Type 1L of the MDOT 2020 Standard Specifications for Construction for Portland Cement, ASTM C595.

### B. Masonry Sand

Masonry Sand must conform to the requirements of "Natural Sand, 2MS" of the MDOT 2020 Standard Specifications for Construction.

### C. Water

Water for mixing mortar must be obtained from the public water supply unless otherwise approved by the Engineer.

## 2.05 CONCRETE

Concrete for pipe encasement, special pipe embedment, manhole bases and similar items must meet the requirements of the MDOT 2020 Standard Specifications for Construction for Grade 3000 concrete. Grade 3000 concrete must have a minimum compressive strength of 3,000 psi at 28 days.

## 2.06 MANHOLE MATERIALS

### A. Precast Units

Unless otherwise specified, all manholes must be precast and watertight.

Where manholes are anticipated to have corrosive conditions due to septicity, force main connection or other causes, additional corrosion protection or alternative manhole materials may be specified on the Drawings or in the Project Specifications.

Precast reinforced concrete manhole risers and precast reinforced concrete manhole conical top sections must conform to the requirements of ASTM C478. Bituminous waterproofing must be applied to the outer surface of the manhole at a rate of one gallon per 100 square feet. Manholes must be free of holidays and open pinholes.

Unless otherwise specified, joints for precast sections must be premium rubber joints conforming to the requirements of ASTM C443. Rubber gaskets must meet the physical requirements of ASTM C1619.

### B. Steel Reinforcement

Steel Reinforcement must conform to the requirements for steel reinforcement of Section 905 of the MDOT 2020 Standard Specifications for Construction.

### C. Flexible Manhole Connectors (Rubber Boots)

Flexible manhole connectors (also called rubber boots) must be "Kor-N-Seal" by Trelleborg, "PSX: Direct Drive" by Press Seal Gasket Corporation; or approved equal. Flexible manhole connectors must conform to the requirements of ASTM C923.

### D. Manhole Steps

Unless otherwise specified, manhole steps must be plastic coated steel steps conforming to the requirements of ASTM Designation C478, or approved equal, spaced at sixteen inches (16") on center.

### E. Adjusting Rings

Unless otherwise specified, adjusting rings must be:

1. Precast and conform to the requirements of ASTM C478.
2. Black Expanded Polypropylene (EPP) adjusting rings.
3. Black Recycled Rubber adjusting rings.
4. Cretex Pro-Rings.

Products:

- Flex-O-Ring, American Highway Products
- Pro-Ring, Cretex Specialty Products
- Infra-Riser, East Jordan Iron Works

F. Castings

Castings must meet the requirements specified in the MDOT 2020 Standard Specifications for Construction Section 908. Manhole covers and rings and similar combinations of castings must be machined to provide an even bearing.

Unless otherwise specified, manhole castings must be provided with a minimum 24-inch opening and must be as follows:

General use: EJ No. 1045Z Frame and EJ No. 1040A Cover (Part Number 00104076) or approved equal.

Off Road/Cross Country Locations: EJ No.1045ZPT Frame and EJ No. 1040APT (bolted) or approved equal.

G. Adjusting Drainage Structures

Furnish materials in accordance with subsection 403.02 of the Standard Specifications for Construction with the following exceptions:

Furnish Concrete, Grade 3500 or Grade P-NC as directed by the Engineer in accordance with sections 1004 and 1006 of the Standard Specifications for Construction, respectively. Furnish epoxy anchored lane ties in accordance with section 914 of the Standard Specifications for Construction. Ensure the lane ties are #5 bar size with a nominal length of 18 inches. Ensure the circular bar for the rotary cut application is epoxy coated #5 bar of a diameter that will center it between the structure cover and the existing surrounding pavement. Select epoxy for anchoring lane ties into the concrete from section 712.03J of the Qualified Products List. Furnish hot-poured joint sealant in accordance with section 914 of the Standard Specifications for Construction.

For concrete curb, concrete curb and gutter, or concrete traffic island repairs furnish materials in accordance with the standard specifications.

**FORCE MAIN SEWER**

**2.07 DUCTILE IRON PIPE**

A. Pipe

Ductile iron pipe must conform to the requirements of AWWA C151 (ANSI A21.51). Ductile iron pipe must be Class 53 unless otherwise specified.

All pipe must have a cement mortar lining with seal coat conforming to the requirements of AWWA C104 (ANSI A21.4).

B. Fittings

All fittings must be ductile iron in accordance with AWWA C153 (ANSI A21.53). Fittings twenty-four (24) inches in diameter and smaller must have a minimum pressure rating of 350 psi; fittings larger than twenty-four (24) inches in diameter must have a minimum pressure rating of 250 psi. Fittings must have either cement mortar lined with seal coat in accordance with AWWA C104 (ANSI A21.4) or fusion bonded epoxy coating in accordance with AWWA C116 (ANSI A21.16).

C. Joints

Unless otherwise specified, all pipe joints must be rubber gasket joints conforming to the requirements of AWWA C111 (ANSI A21.11) for bolted mechanical joints or

push-on joints. Joints on fittings must be bolted mechanical joints. Joints on fittings must be restrained in accordance with Section 3.15.

D. Plastic Wrap for Pipe

Where indicated on the drawings or in the specifications, the pipe must be encased in a seamless polyethylene tube, in accordance with AWWA C105 (ANSI A21.5) of eight (8) mills minimum thickness. The ends of adjacent sections of polyethylene tubing must be overlapped a minimum of one (1) foot, and the joint taped or otherwise secured to prevent displacement during backfill operations.

When plastic wrap is being used, the wrap must be extended beyond the exposed portion of existing mains being connected to and secured to the pipe.

**2.08 POLYVINYL CHLORIDE (PVC) AND MOLECULARLY ORIENTED PVC (PVCO) PIPE**

(When approved by Engineer or specified in project specifications.)

A. Pipe

Polyvinyl chloride (PVC) pipe, four (4) inch through twelve (12) inch diameter, must conform to ANSI/AWWA C900. The pipe must have a pressure rating of 305 psi. The PVC pressure pipe must have an outside diameter equivalent to cast iron and ductile iron pipe.

Molecularly Oriented Polyvinyl Chloride (PVCO) pipe four (4) inch through twelve (12) inch diameter must conform to ANSI/AWWA C909. The pipe must have a pressure rating of 305 psi. The PVCO pressure pipe must have an outside diameter equivalent to cast iron and ductile iron pipe.

B. Fittings

Fittings must be ductile iron as specified in Section 2.07 Item B.

Anchorage (restraint) of bends, tees, plugs and all other fittings must be per Section 3.15 of this specification.

C. Joints

Joints must be bell and spigot with elastometric rubber gasket conforming to Section 4 of AWWA C900, C905, or C909, as applicable.

**2.09 HIGH DENSITY POLYETHYLENE (HDPE)**

(When approved by Engineer or specified in project specifications.)

A. Materials

Pipe must be manufactured from a PE 4710 resin listed with the Plastic Pipe Institute (PPI) as TR-4. The resin material must meet the specifications of ASTM D3350 with a minimum cell classification of PE445474C. Pipe must have a manufacturing standard of ASTM D3035 and be manufactured by an ISO 9001 certified manufacturer. The pipe must contain no recycled compounds except that generated in the manufacturer's own plant from resin of the same specification from the same raw material. The pipe must be homogeneous throughout and free of visible cracks, holes, foreign inclusions, voids, or other injurious defects. The polyethylene compound must be suitably protected against degradation by ultraviolet light by means of carbon

black of not less than 2 percent. The manufacture of the HDPE resin must certify the cell classification indicated.

Pipe sizes three-inch and larger must have a manufacturing standard of ASTM F714. Dimension Ratio (DR) and Outside Diameter (IPS/DIPS) must be as specified on the drawings.

The pipe must have a minimum working pressure rating of 160 psi. Pipe must be supplied with a permanently co-extruded green stripe on the pipe outside surface as part of the pipe's manufacturing process.

**B. Fittings**

**1. Butt Fusion Fittings:**

Fittings must be manufactured from a PE 4710 resin listed with the Plastic Pipe Institute (PPI) as TR-4. The resin material must meet the specifications of ASTM D3350 with a minimum cell classification of PE445474C. Molded butt fusion fittings must be in accordance with ASTM D3261 and must be manufactured by injection molding. Fabricated fittings must be in accordance with ASTM F2206 and be manufactured by a ISO 9001 certified facility. All fittings must be pressure rated to provide a working pressure rating no less than that of the pipe. The fitting must be homogeneous throughout and free of visible cracks, holes, foreign inclusions, voids, or other injurious defects.

**2. Electrofusion Fittings:**

Electrofusion fittings must be manufactured from a PE 4710 resin listed with the Plastic Pipe Institute (PPI) as TR-4. The resin material must meet the specifications of ASTM D3350 with a minimum cell classification of PE445474C and be the same base resin as the pipe.

Electrofusion fittings must have a manufacturing standard of ASTM F1055. All fittings must be pressure rated to provide a working pressure rating no less than that of the pipe.

**3. Flanged and Mechanical Joint Adapters:**

Flanged and mechanical joint adapters must be PE 4710 HDPE, cell classification of 445474C as determined by ASTM D3350 and be the same base resin as the pipe. Flanged and mechanical joint adapters must have a manufacturing standard of ASTM D3261. All adapters must be pressure rated to provide a working pressure rating no less than that of the pipe.

**2.10 RESILIENT SEATED GATE VALVES**

Resilient seated gate valves must be added at manifolds of force main or as shown on the drawings.

All valves must conform to AWWA C509 or C515, Standards for Resilient-Seated Gate Valves for Water Supply Service. The valves must be fully bronze mounted and must be furnished with O-ring packing. The direction of the opening must conform to the Owners standards.

Valves must be EJ FlowMaster, Clow Valve Co. R/W Resilient Wedge, American Resilient Wedge, or equal.

## **2.11 VALVE BOXES**

Valve boxes must be screw type, three sectional, adjustable with round bases with an overall length sufficient to permit the tops to be set flush with the established pavement or ground surface. The box must be provided with a cast iron lid or cover and marked with the word "SEWER". The valve boxes must be designed to withstand heavy traffic.

## **PIPE EMBEDMENT**

### **2.12 GENERAL**

Unless otherwise specified or shown on the Drawings, all pipe embedment must be Class B pipe embedment as shown on the Standard details. When the soil in the bottom of the trench at pipe subgrade meets all the requirements for Granular Material Class III as specified in the MDOT 2020 Standard Specifications for Construction, Section 902.07 and in the opinion of the Engineer will provide suitable bedding for the pipe, such soil may be utilized as bedding material and prepared to receive the pipe as specified without undercutting and subsequent replacement.

### **2.13 FLEXIBLE PIPE EMBEDMENT**

Plastic pipe embedment must comply with ASTM D2321. Bedding material must meet the requirements of Section 902.07 of the MDOT 2020 Standard Specifications for Construction for granular materials Class II, modified to 100% passing a 1" sieve must be used. If stone is used for bedding, it must meet the requirements of ASTM D2321 (Table 1 – Embedment Classes for Plastic Pipe) for Class 1A crushed stone. An Engineer approved geotextile filter fabric must wrap around all stone in areas where Class 1A crushed stone pipe embedment is used. Transition zones between crushed stone and sand embedment must be separated by a geotextile fabric.

### **2.14 TRENCHLESS CASING INSTALLATION (BORE & JACK)**

#### **A. Materials**

##### **1. Casing:**

Casing must meet the requirements of ASTM A53, Type E or S, Grade B steel with a minimum yield strength of 35,000 psi. and be designed for Cooper E80 loading requirements. In all cases, the allowable jacking strength capacity of the casing pipe must be capable of withstanding the maximum jacking forces imposed by the operation. The casing pipe size and thickness must be as shown on the drawings.

Exterior coating and interior lining of the casing is not required.

Casing joints must be continuously welded. Joints must be watertight and capable of withstanding stresses due to handling and installation.

Casing ends must be free of burs or sharp edges.

##### **2. Carrier Pipe:**

Carrier pipe must be as specified in the applicable pipe specifications.

Exterior coating and interior lining systems are to be continuous through the casing.

##### **3. Casing Spacers:**

Casing spacers must be provided by the carrier pipe manufacturer. Spacers must electrically isolate the carrier pipe from the casing.

Timber blocking with straps is prohibited.

Location of casing spacers to be per pipe and casing spacer manufacturer requirements. Spacers must be designed to support the weight of the carrier pipe full of water assuming no support from interstitial material. Spacers must also be designed to prevent floatation of the carrier pipe assuming it is empty.

4. Casing End Seals:

Casing end seals must meet the requirements of the authority having jurisdiction over the facility affected. End seals must prevent soil migration and must be constructed so as not to damage the carrier pipe coating.

5. Controlled Low Strength Material (CLSM) (Flowable Fill):

CLSM mix design must produce a consistency that results in a flowable product which is non-segregating, does not require consolidation, and following hydration can be excavated with hand tools.

Materials must comply with the recommendations of ACI 229R.

Portland Cement: ASTM C 150, Type I, or II.

Fly Ash: ASTM C 618, Class C.

Coarse Aggregate: Maximum aggregate size of 3/8-inch.

Fine Aggregate: Concrete sand. No more than 12 percent of fine aggregate must pass the No. 200 sieve, and no plastic fines must be present.

Combined aggregate must be graded to produce flowable fill that has optimum flow and consolidation characteristics.

Proportion CLSM mixture to meet the following requirements:

Compressive Strength: Minimum 150 psi, maximum 200 psi at 28 days.

Slump Limit (Flowability): As required for Contractor's methods. Must not promote segregation and must be 9 inches maximum.

Shrinkage: CLSM must have minimal bleed water shrinkage.

Mix Design: The CLSM mix design must be proportioned such that the final product meets the strength, flow consistency, and other requirements of this specification.

Flowable fill must be protected from freezing for at least 24 hours after placement. The ambient temperature must be 35 degrees and rising at the time of placement.

## **PART 3 EXECUTION**

### **3.01 INSPECTION**

#### **A. Shop Inspection**

All materials furnished by the Contractor are subject, at the discretion of the Owner, to inspection and approval at the Manufacturer's plant. The inspection in the plant of the manufacturer of materials furnished by the Contractor will be made at the expense of the Owner.

#### **B. Field Inspection**

It must be the responsibility of the Contractor to inspect all materials for cracks, flaws or other defects before they are incorporated into the work.

#### **C. Disposition of Defective Material**

All material found during the progress of the work to have cracks, flaws, or other defects will be rejected by the Engineer. All defective materials furnished by the Contractor must be promptly removed from the site. Any material furnished by the Owner and found defective will be set aside and removed from the site of the work by the Owner.

### **3.02 RESPONSIBILITY FOR MATERIAL**

#### **A. Responsibility for Material Furnished by Contractor**

The Contractor must be responsible for all material furnished by it and must replace at its own expense all such material found defective in manufacturing or damaged in handling after delivery by the manufacturer. This must include the furnishing of all material and labor required for the replacement of defective or damaged installed material discovered prior to the final acceptance of the work.

#### **B. Responsibility for Material Furnished by Owner**

The Contractor's responsibility for material furnished by the Owner must begin at the point of its delivery to the Contractor. Materials already on the site shall become the Contractor's responsibility on the day of the award of the contract. The Contractor must examine all material furnished by the Owner at the time and place of delivery to the Contractor and must reject all defective material. Any material furnished by the Owner and installed by the Contractor without discovery of such defects will, if found defective prior to final acceptance of the work, be exchanged for sound material by the Owner. The Contractor, however, must at its own expense, furnish all supplies, labor, and facilities necessary to remove said defective material and install the sound material in a manner satisfactory to the Engineer.

#### **C. Responsibility for Safe Storage**

The Contractor must be responsible for the safe storage of material furnished by or to it, and accepted by it, and intended for the work, until it has been incorporated in the completed project. The interior of all pipe, fittings, and other accessories must be kept free from dirt and foreign matter at all times.

#### **D. Replacement for Damaged Material**

Any material furnished by the Owner that becomes damaged after acceptance by the Contractor must be replaced by the Contractor at its own expense.

### 3.03 HANDLING OF MATERIAL

The Contractor must use care and proper equipment during the unloading and distribution of sanitary sewer materials on the job site to ensure the materials are not damaged.

Material handling and storage must be in accordance with manufacturer's guidelines.

Pipe and/or fittings must not be rolled or skidded off the truck beds against previously unloaded materials.

### 3.04 LAYING OF GRAVITY PIPE

Pipe must be installed in accordance with ASTM D2321 for PVC pipe and ASTM D2680 for PVC Truss pipe, in addition to manufacturer instructions and the following specifications for all pipe types.

Pipe layers must have demonstrated experience in the laying and joining of the specific products to be utilized.

#### A. Alignment and Grade

The Contractor must use the laser beam method of maintaining line and grade for sewer construction, unless otherwise approved by the Engineer. The Contractor must provide a qualified operator to handle the laser beam equipment during construction.

The Engineer will place line and grade stakes at each manhole, or more often, as determined by the Engineer. The Contractor must check the line and grade at every point at which a stake has been placed.

Unless otherwise specified, horizontal alignment must be within 0.5' and vertical grades must be within 0.03' of the design line and grades shown on the Drawings.

#### B. Handling

Pipe and piping materials must be handled with care to avoid damage.

Contractor must only use nylon ropes, slings, or other lifting devices that will not damage the surface of the pipe.

#### C. Direction of Laying

Excavation of trenches and laying of pipe must begin at the outlet for the sewer and proceed upgrade with the individual pipe being laid with the spigot end downstream.

#### D. Placing

Prior to installation, each pipe length must be carefully inspected for damage and the pipe ends carefully cleaned.

The pipe must be placed on the prepared sub-grade and held firmly in place during subsequent pipe jointing and embedment operations. Successive pipes must be carefully positioned so that when laid, they form a sewer with a uniform invert true to line and grade.

#### E. Joint Making

Pipe joints must be installed in strict accordance with the pipe and fitting manufacturer's recommendations and the following requirements.

A thin film of joint lubricant must be applied to the inside of the gasket and the outside of the spigot prior to inserting the spigot into the bell. Lubricated spigot ends must be kept free of soil and debris.

The spigot end of the pipe must be carefully inserted into the bell and sufficient pressure applied until the reference mark or maximum insertion mark on the spigot is flush with the bell. The spigot must not be inserted into the bell past the reference mark or maximum insertion mark.

When using a field cut plain end piece of pipe, the pipe end must be beveled to the same angle and length as provided on the factory-finished pipe and an insertion mark redrawn on the pipe end using a factory-marked spigot from the same manufacturer as a guide.

Care must be exercised to prevent joint movement as successive lengths of pipe are placed. The Contractor must take the necessary precautions when using a trench box to prevent joint separation when the box is pulled ahead.

Joint deflection is not permitted unless specifically noted on the Drawings or in the Project Specification. If permitted, joint deflection must not exceed the Pipe Manufacturer's recommendation.

F. Connections to Structures and Casings

For sewers 18" in diameter and greater, a pipe joint must be located within two-to-four feet (2'-4') of all structure faces and casing ends, unless otherwise specified.

G. Protection of Existing Sewer

The interior of the sewer must be kept clean of all jointing material, dirt, and debris. In smaller sewer where cleaning after laying may be difficult, a swab or drag may be required in the pipeline to satisfactorily complete this work.

Where possible, a plug must be installed on the downstream end of the sewer to prevent any sand and debris from entering the existing sewer. The plugs must not be removed until the new sewer has been cleaned and accepted by the Owner.

At the end of the workday, the open ends of the pipe must be sealed with a water-tight plug or other means approved by the Engineer.

### **3.05 LOCATION OF WYES AND TEES**

Location of proposed wyes or tees shown on the Drawings is approximate and may be adjusted where necessary to best serve the various properties. Contractor must coordinate with the Engineer in advance of mainline sewer construction to determine exact wye and tee location.

On existing and/or replacement sewer runs with existing lateral connections, Contractor is required to locate the existing sanitary lateral at the proposed connection point prior to commencing mainline sewer installation to ensure proper location of the wye and tee.

Contractor must keep an accurate record of measurements from the nearest downstream manhole to each wye or tee which is installed and furnish a copy of these measurements to the Engineer.

### **3.06 SANITARY SEWER LATERALS**

A. General

Installation of sanitary sewer laterals must meet all requirements specified for sanitary sewers. All laterals must be inspected by the Engineer before the trench is backfilled.

In general, sanitary sewer laterals must be laid at right angles to the sanitary sewer mainline unless otherwise shown on the Drawings.

The minimum grade on laterals is 2 percent (1/4 in/ft). When minimum grade cannot be obtained and when approved by the Engineer, minimum grades may be reduced to 1 percent (1/8 in/ft).

Cleanouts are required at lateral connections where alignment and/or grade are not continuous, or as directed by the Engineer. Cleanouts must be constructed in accordance with the standard details or as shown on the Drawings.

B. Replacement Laterals

Connections to existing sanitary laterals must be made within one foot of the street right of way or easement limit unless otherwise directed or shown on the Drawings.

If the outer diameter of the existing sanitary lateral is less than the inner diameter of the proposed sanitary lateral, then a minimum 2" of the existing sanitary lateral must extend into the proposed sanitary lateral.

The Engineer must be notified if existing lateral grades prohibit minimum grade on the replacement lateral.

Installation of a main line riser must be approved by the Engineer. Riser must be constructed in accordance with the standard details or as shown on the Drawings. Backfill must be carefully placed and compacted around the riser in an approved manner which will not damage the sewer or riser.

C. New Laterals

It is intended that the ends of laterals at property lines will be deep enough to service the lowest floor of all existing buildings by gravity flow.

Where the elevation of the end of the lateral to serve an existing structure is not shown on the drawings it must be set at 3 feet below basement grade for standard houses (11 feet below first floor) or 4 feet below basement grade for houses with walkout basements (12 feet below first floor) where the setback is 50 feet or less.

When the house is set back further than 50 feet it may be set at 2 feet below the basement elevation for standard houses (3 feet for walkouts) plus an additional depth of 2 percent multiplied by the setback distance to the structure.

The minimum depth of the end of the lateral at the property line in all cases must be a minimum 9 feet below center line of the street.

Main line risers must only be installed where specified and must be constructed in accordance with the standard details or as shown on the Drawings. Backfill must be carefully placed and compacted around the riser in an approved manner which will not damage the sewer or riser.

Property line risers must be constructed at the end of the lateral and must extend to one (1) foot above the normal groundwater table or four (4) feet below grade, whichever is the closest to finished grade. In all cases the lateral must have a minimum of two (2) feet of cover.

New sanitary laterals must extend to a point one foot outside the street right of way or easement limit unless otherwise directed. No payment will be made for pipe laid beyond this point unless specifically required by the Engineer.

Contractor must provide and install a 2" x 2" wood marker and 1/2" diameter by 3' long metal stake for each service. The wood marker must be set vertically from the end of the lateral to twelve (12) inches above finish surface elevations and the metal stake must be set adjacent to the wood marker with 6 inches of cover.

D. Record Measurements

Contractor must keep accurate records for each lateral installed and furnish a copy of the measurements shown in the Standard Lateral As-Built Detail, or owner-specific measurements, to the Engineer.

### 3.07 **MANHOLE CONSTRUCTION**

Manholes must be constructed in accordance with the standard details and as specified herein. Manholes must be watertight.

Precast bases must be installed on sand or gravel subbase in such a way as to provide a uniform bearing under the manhole base.

Precast manholes with integral bottom and channel may be used; however, any changes to the structure due to minor field adjustments in alignment and grade required to meet construction conditions, must be made by the Contractor at no additional cost to the Owner.

Benches must be constructed from the invert to the crown on the pipe for the entire length of the manhole or junction point. Benches must be sloped no less than 1/2 inch per foot (4 percent). No lateral sewer, service connection, or drop manhole pipe must discharge onto the surface of the bench.

Stubs must be provided in manholes for future connections as shown on the drawings or as directed by the Engineer. All such stubs must be sealed with standard watertight, removable plugs.

All openings in manholes for the purpose of receiving pipes (including openings for future pipes) must be fitted with a flexible manhole connector. Flexible manhole connectors must be factory installed. Openings for future connections must be sealed by an approved prefabricated cap or plug.

Precast concrete adjusting rings must be used to bring existing and new manhole structure covers to grade. Adjusting rings and casting frame must be set on a full mortar bed, and all cracks and gaps in the mortar bed must be filled and finished to create a smooth surface. All castings must be recessed one-quarter (1/4) to one-eighth (1/8) inch below the top of HMA pavement and flush with the top of concrete pavement. After the cover is brought to grade, the entire hole created by excavating to raise the casting must be filled in three-inch (3") lifts with Hot Mix Asphalt (HMA) to the top of the leveling course and air tamped to achieve proper compaction. HMA mixture must be the same mixture placed for the leveling course, unless otherwise approved by the Engineer. Special care must be taken to prevent debris from entering sewers.

### 3.08 CASTING ADJUSTMENTS

#### A. Description

This work consists of adjusting drainage structures, including utility manhole covers, in accordance with section 403 of the Standard Specifications for Construction, as shown on the plans, as directed by the Engineer, and as stated herein.

#### B. Construction

For structures within the pavement area remove pavement adjacent to the drainage structure cover using a rotary or sawing method. When using a rotary coring method, remove a minimum 4 foot diameter section of pavement around the drainage structure frame and cover. If the frame outside diameter measurement is greater than 36 inches, use a rotary coring head to remove a minimum 4.5 foot diameter section of pavement. When using a sawing method, saw cut clean and remove a 6 foot by 6 foot pavement square.

For structures within the curb line, saw cut and remove a 4 foot by 6 foot section of pavement around the frame with the 6 foot dimension measured along the curb line. Remove curb and/or curb and gutter associated with the adjustment of structures, as directed by the Engineer.

For structures located adjacent to concrete traffic control islands, remove concrete island full- width or up to 6 feet wide to facilitate adjustment of the drainage structure cover frame, as directed by the Engineer.

Prior to setting the frame, compact exposed soil using a method approved by the Engineer.

Support the cover frame over the structure matching the adjacent roadway cross slope. Secure the frame in-place to allow for placement of concrete using brick or block as required on a full bed of mortar without altering frame position.

Install epoxy anchored lane ties in accordance with section 603 of the Standard Specifications for Construction to anchor the concrete to adjacent composite pavement. Install circular epoxy coated bar as detailed herein. For structures within the pavement area, replace pavement around the frame with Concrete, Grade 3500 or Grade P-NC as directed by the Engineer matching the finished elevation and cross-slope of the roadway. Construct plane of weakness joint as directed by the Engineer.

For structures within the curb line, replace pavement around the frame with Concrete, Grade 3500 or Grade P-NC as directed by the Engineer and HMA top course as shown on the detail herein. Install epoxy anchored lane ties to anchor the concrete to adjacent composite pavement for curb drainage structures located in curbed areas. Replace concrete curb, concrete curb and gutter, or concrete traffic control islands in-kind in accordance with Standard Plan R-30 Series and section 802 of the Standard Specifications for Construction.

Immediately remove any debris that falls into drainage structures or other utility manholes due to Contractor operations.

Ensure saw overcuts are cleaned and sealed with hot-poured joint sealant.

### 3.09 CUT-INS

When cutting into an existing manhole, the opening must be no larger than is necessary to admit the new sewer. The opening must be made by a concrete drilling or coring machine

and must have a mechanically compressed flexible joint connection installed. All broken or surplus material falling inside the structure must be removed.

Flow channels and/or drop connections must be constructed as specified or as directed to accommodate the sewer being cut-in.

Unless otherwise specified, cut-ins will be considered part of the major items of work, and no specific payment will be made therefor.

### **3.10 ACCEPTENCE TESTS**

#### **A. Alignment and Grade**

Each section of sewer may be checked by the Engineer for alignment and grade using lights and mirrors, television inspection, or other similar means. The Contractor must assist the Engineer in the performance of these tests when necessary.

If a section of sewer is determined by the Engineer not to be acceptable for alignment or grade, the Contractor must relay the sewer at no additional cost to the Owner.

#### **B. Leakage Tests**

The completed sewer must be free from leaks. Manholes will be visually inspected for leakage. No more than 1,000 feet of main sewer will be considered for partial payment until it has been satisfactorily tested and approved.

The Contractor must provide all necessary labor, equipment, and supervision to perform leakage testing in accordance with these requirements.

##### **1. Air Test:**

All sewers must be subjected to an air test, unless otherwise specified in the Project Specifications. In lieu of air testing reconstructed sanitary sewer pipe and/or sanitary laterals, Contractor may perform a Televising inspection, subject to Engineer approval.

The air test must be performed on each section of pipe between manholes after laterals are installed. Testing must conform to ASTM F1417. The section of pipe being tested must be sealed at each manhole using inflatable plugs or other approved devices. All plugs must be adequately braced.

Testing pressure is determined by the expected water table level in a dewatered or partially dewatered trench and by the actual groundwater level in a non-dewatered trench, as determined by the soil borings. In a non-dewatered trench, the test pressure is determined by adding 0.43 psi per foot of groundwater above the invert of the pipe to a baseline of 3.5 psig.

For example, in a non-dewatered trench with a groundwater table approximately 2 feet above the pipe invert, the beginning test pressure would be 4.36 psi ( $3.5 + 0.43 \times 2 = 4.36$ ).

At no time must internal pressure exceed 9 psig.

BEGINNING AIR TESTING PRESSURE FOR LEAKAGE TEST

Dewatered Trench	Expected Groundwater Level Above Pipe Invert [ft]	Beginning Test Pressure [psig]
	0'-7'	3.5
	7'+	4.5
Non-Dewatered Trench	Groundwater Level Above Pipe Invert [ft]	Beginning Test Pressure [psig]
	1	3.9
	2	4.4
	3	4.8
	4	5.2
	5	5.7
	6	6.1
	7	6.5
	>7	Coordinate with Engineer

The air pressure in the section under test must be raised to an initial pressure of 0.5 psig above the beginning test pressure and allowed to stabilize for a minimum of five (5) minutes. Air must be added during this stabilization period as required to maintain the pressure at or above the beginning test pressure.

The minimum time interval for a satisfactory test is in accordance with Table 1 on the following page. Ending test pressure after the minimum time interval must not be less than 1.0 psig below the beginning test pressure. Makeup air must not be added during the time interval.

In the event the Engineer determines that the results of the air test are inconclusive because of visible infiltration, unsatisfactory or incomplete records, or improper application of testing methods or equipment, or other similar reasons, the Engineer may require additional leakage testing for the section or sections of sewer involved.

**TABLE 1 – PVC PIPE**

Pipe Diameter, in.	Minimum Time, min:s	Length for Minimum Time, ft	Time for Longer Length, s	Specification Time for Length (L) Shown, min:s								
				100 ft	150 ft	200 ft	250 ft	300 ft	350 ft	400 ft	450 ft	
4	3:46	597	0.380 L	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46	3:46
6	5:40	398	0.854 L	5:40	5:40	5:40	5:40	5:40	5:40	5:40	5:42	6:24
8	7:34	298	1.520 L	7:34	7:34	7:34	7:34	7:36	8:52	10:08	11:24	
10	9:26	239	2.374 L	9:26	9:26	9:26	9:53	11:52	13:51	15:49	17:48	
12	11:20	199	3.418 L	11:20	11:20	11:24	14:15	17:05	19:56	22:47	25:38	
15	14:10	159	5.342 L	14:10	14:10	17:48	22:15	26:42	31:09	35:36	40:04	
18	17:00	133	7.692 L	17:00	19:13	25:38	32:03	38:27	44:52	51:16	57:41	
21	19:50	114	10.470 L	19:50	26:10	34:54	43:37	52:21	61:00	69:48	78:31	
24	22:40	99	13.674 L	22:47	34:11	45:34	56:58	68:22	79:46	91:10	102:33	
27	25:30	88	17.306 L	28:51	43:16	57:41	72:07	86:32	100:57	115:22	129:48	
30	28:20	80	21.366 L	35:37	53:25	71:13	89:02	106:50	124:38	142:26	160:15	
33	31:10	72	25.852 L	43:05	64:38	86:10	107:43	129:16	150:43	172:21	193:53	
36	34:00	66	30.768 L	51:17	76:55	102:34	128:12	153:50	179:29	205:07	230:46	

Note: Table to be used when testing one diameter only.

When testing two sizes of pipe simultaneously, time shall be computed by the ratio of lengths involved.

$$\text{Time} = \frac{\text{Length 1} \times \text{Time 1} + \text{Length 2} \times \text{Time 2}}{\text{Length 1} + \text{Length 2}}$$

2. Infiltration and Exfiltration Tests:

Infiltration and exfiltration testing are not required unless otherwise specified in the Project Specifications or directed by the Engineer due to a failed leakage test.

Allowable leakage rate from an infiltration and exfiltration test must not exceed 25 gal/in of internal pipe diameter/mile/day.

C. Pipe Deflection Tests

A pipe deflection test is required for all pipe with a stiffness of 115 psi or less as defined under the requirements of ASTM Designation D2412. Truss pipe will not require a deflection test if it has less than twelve feet (12') of cover.

Deflection requirements are for the flexible pipe only. Where the pipe interacts with other appurtenances, such as connections to structures, laterals, other pipes or other materials, deflection requirements may be more prescriptive.

The completed installation of flexible pipe less than 24" in diameter must at no point have out-of-round deflections in the main sewer pipe greater than five percent (5%) of the pipe's base inside diameter.

The completed installation of flexible pipe 24" in diameter and greater must at no point have out-of-round deflections in the main sewer pipe greater than three percent (3%) of the pipe's base inside diameter.

Go/no go gauging tests, using an approved pointed mandrel with nine (9) points, must be performed by the Contractor in the presence of the Engineer, or his authorized representative after the trench is backfilled, and prior to pavement surfacing or completion of final grade.

Pipe with deflections greater than the amount specified must be relaid by the Contractor at no additional expense to the Owner. Use of mechanical devices or equipment to complete the go/no go tests and vibratory rerounding of failed sections are prohibited. A minimum of thirty (30) days must elapse between backfilling and deflection testing.

D. Televising

After the pipe deflection test, placement of base course (when the pipe is proposed under pavement), and pipe cleaning (when the sewer has been live prior to televising), the Contractor must conduct a continuous video recording inspection of all sanitary sewers. The inspection and documentation must meet the requirements of the National Association of Sewer Service Companies (NASSCO) specification for television inspection of sewers. Closed-circuit television (CCTV) recording must be conducted in compliance with the North American Pipeline Assessment and Certification Program (PACP) standards for sewer defect identification and assessment. Work must be performed by a PACP- certified operator and delivered on professional quality recording media. The televising software must be PACP-certified by NASSCO and must be capable of both exporting to and importing from the standard PACP database.

If the television inspection of an entire section (manhole to manhole) cannot be successfully performed from one manhole, a reverse setup must be performed per PACP requirements as a second survey.

Each pipe inspected must include a video file in .mp4 or .mpeg format, a PDF report showing inspection results, and inspections and observations in GIS format (Shapefile or Esri File Geodatabase). The video file must show the name of the project, the purpose of inspection, the date and approximate time of recording, the name of the street, and the manhole numbers of each end of each run (the “from” and “to” manholes). The inspection must clearly show the pipe interior, joints, alignment, and wye locations and stations. The inspection will be reviewed by the Engineer for evidence of compliance with the Contract Documents for workmanship and materials. Data can be delivered via portable hard drive or cloud-based file sharing site.

### **3.11 LAYING OF FORCE MAIN PIPE**

#### **A. Alignment and Grade**

##### **1. General:**

The force main must be laid and maintained to the required lines and grades with fittings at the required locations. All force mains must maintain a ten (10) feet horizontal separation and eighteen (18) inch vertical separation from water main.

##### **2. Deviations Occasioned by Other Structures:**

Whenever obstructions not shown on the drawings are encountered during the progress of the work and interfere to such an extent that an alteration in the drawings is required, the Engineer has the authority to change the drawings and order a deviation from the line and grade or arrange with the owner of the structures for the removal, relocation, or reconstruction of the obstructions. If the change in drawings results in a change in the amount of work by the Contractor, such altered work must be done by written order only on the basis of payment to the Contractor for extra work or credit to the Owner for less work.

##### **3. Depth of Pipe:**

All pipe must be laid with the top of the pipe a minimum depth of five (5) feet below established street center line grade, and with a minimum cover of five (5) feet below existing grade at the force main, unless specified otherwise. When elevations and grades are provided on the drawings, the Contractor must install in accordance with those elevations and grades.

#### **B. Laying**

##### **1. Lowering of Force Main Material into Trench:**

Proper implements, tools, and facilities must be provided and used by the Contractor for the safe and expedient completion of the work. All pipe and fittings must be carefully lowered into the trench by means of suitable tools or equipment, in such a manner as to prevent damage to force main material and protective coatings and linings. Under no circumstances may force main materials be dropped or dumped into the trench.

If damage occurs to any pipe or fittings in handling, the damage must be immediately brought to the Engineer's attention. The Engineer will prescribe corrective repairs or rejection of the damaged items.

2. Inspection Before Installation:

All pipe and fittings must be carefully examined for cracks and other defects while suspended above the trench immediately before installation in final position. Spigot ends must be examined with particular care as this area is the most vulnerable to damage from handling. Defective pipe or fittings must be laid aside for inspection by the Engineer, who will prescribe corrective repairs or rejection.

3. Cleaning of Pipe and Fittings:

All lumps, blisters, and excess coating must be removed from the bell and spigot ends of each pipe, and the outside of the spigot and the inside of the bell must be wire brushed and wiped clean and dry and free from oil and grease before the pipe is laid.

4. Laying of Pipe:

All dirt or other foreign material must be removed from the inside of the pipe before it is lowered into its position in the trench, and it must be kept clean by approved means during and after laying. No tools or other articles may be stored in the pipe at any time.

For bell and spigot pipe as each length of pipe is placed in the trench, the spigot end must be centered in the bell and the pipe forced home and brought to correct line and grade. For force main construction, the spigot end must be installed in the direction away from the pump station so as to minimize effluent material hanging up on the pipe joints. The pipe must be secured in place with approved backfill material tamped under it except at the bells. Precautions must be taken to prevent dirt from entering the joint space.

At times when pipe laying is not in progress, the open ends of the pipe must be closed by a watertight plug or other means approved by the Engineer. This provision must apply during the noon hour as well as overnight. If water is in the trench, the seal must remain in place until the trench is pumped completely dry.

5. Cutting of Pipe:

The Contractor must cut the pipe in a straight and uniform manner, at right angles to the axis of the pipe, wherever necessary for placing valves, fittings, or closure pieces without damage to the pipe, and without extra cost to the Owner. The cut ends of the pipe must be beveled before assembly of the joint.

The method of cutting pipe will be subject to the approval of the Engineer.

6. Locator Wire and Marking Posts:

A 12 AWG insulated copper locator wire must be attached to the force main pipe (regardless of material type) at approximately five (5) feet intervals using tape or other suitable methods to assure that the wire is not dislocated during pipe installation and backfilling. Locator wire must be 12 AWG (min.) high strength locator wire with a minimum break load of 1,150 lbs. Protective insulating coating must be High Molecular Weight, High Density Polyethylene (HWD-HDPE) 45 mil. (min.).

All wire connectors must be dielectric silicone filled to seal out moisture and must be able to provide electrical conductivity. Connectors must be similar to Copperhead SnakeBite™ Locking Connectors or approved equal.

The locator wire must be brought to the surface at all cleanouts and attached to a cleanout plug bolt. At air release valve manholes, the locator wire must be brought to the ground surface and attached to a marking post above grade.

The marking post must be a Rhino TriView™ Marking System including a test station similar to the Rhino TriView™ or approved equal. Marking posts must be colored green and have Force Main labels. Posts must be buried per the manufacturer's recommendations. The marking post and test station must be placed at maximum 1,000-foot intervals with one testing station located at the beginning and the end of the force main and at the air release structures. Testing stations must be located on the right-of-way line.

Approximate testing station and marking post locations are indicated on the drawings; however, the Contractor must coordinate actual locations of the marking posts and test stations with the Owner and Engineer.

Prior to acceptance of the force main the Contractor must verify the continuity of the locator wire in the presence of the Owner or Engineer and repair any breaks in the line. Testing of the locator wire must be completed using a low frequency (512 Hz or similar) line locating equipment. Continuity testing of the locator wire system in lieu of using locator equipment will not be accepted.

### **3.12 JOINING OF MECHANICAL - JOINT PIPE**

#### **A. General Requirement**

The general requirement in Sec. 7.06 - 7.07 inclusive must apply except that, where the terms "bell" and "spigot" are there used, they must be considered to refer to the bell and spigot ends of the lengths of mechanical-joint pipe.

#### **B. Cleaning and Assembly of Joint**

The last eight (8) inches outside of the spigot and inside of the bell of mechanical joint pipe must be thoroughly cleaned to remove oil, grit, excess coating, and other foreign matter from the joint and then coated with a lubricant as supplied or recommended by the pipe manufacturer and approved by the Engineer. The retaining gland must then be slipped on the spigot end of the pipe with the lip extension of the gland toward the socket, or bell, end. The rubber gasket must be coated with lubricant and placed on the spigot end with the thick edge toward the gland.

#### **C. Bolting of Joint**

The entire section of the pipe must be pushed forward to seat the spigot end in the bell. The gasket must then be pressed into place within the bell; care must be taken to locate the gasket evenly around the entire joint. The retaining gland must be moved along the pipe into position for bolting, all of the bolts inserted, and the nuts screwed up tightly with the fingers. All nuts must be tightened with a suitable (preferably torque-limiting) wrench. The torque for various sizes of bolts must conform to ANSI/AWWA C600, Standard for Installation of Ductile-Iron Mains and Their Appurtenances as follows:

<u>Size</u> Inches	<u>Range of Torque</u> Foot – Pounds
5/8	45 - 60
3/4	75 - 90
1	100 - 120
1-1/4	120 - 150

Nuts spaced 180 degrees apart must be tightened alternately in order to produce an equal pressure on all parts of the gland. When tightening bolts, it is essential that the gland be brought up toward the pipe flange evenly, maintaining approximately the same distance between the gland and the face of the flange at all points around the socket. This may be done by partially tightening the bottom bolt first, then the top bolt, next the bolts at either side, and last, the remaining bolts. Repeat this cycle until all bolts are within the above range of torques. If effective sealing is not attained at the maximum torque indicated above, the joint should be disassembled and reassembled after thorough cleaning. Over stressing of bolts to compensate for poor installation practice is not allowed. Unless otherwise specified, Mega-lugs as manufactured by EBAA Iron Sales, Inc. or approved equal must be used for restraining gland.

D. Permissible Deflection in Mechanical Joint Pipe

Whenever it is desirable to deflect mechanical-joint pipe in order to form a long radius curve, the amount of deflection must not exceed the maximum limits shown in Table 2.

TABLE 2  
PERMISSIBLE DEFLECTIONS IN MECHANICAL - JOINT PIPE

Size of Pipe Inches	Max. Permissible Deflection Per Length - Inches		Approx. Radius of Curve Produced By Succession of Joints - Feet	
	18'	20'	18'	20'
3	31	35	125	140
4	31	35	125	140
6	27	30	145	160
8	20	22	195	220
10	20	22	195	220
12	20	22	195	220
14	13.5	15	285	320
16	13.5	15	285	320
18	11	12	340	380
20	11	12	340	380

### 3.13 JOINING OF PUSH-ON JOINT PIPE

#### A. General Requirements

The general requirements in Section 3.10 - 3.11 inclusive must apply except that, where the terms "bell" and "spigot" are there used, they must be considered to refer to the bell and spigot ends of the lengths of push-on joint pipe.

#### B. Cleaning and Assembly of Joint

The inside of the bell and the outside of the spigot end must be thoroughly cleaned to remove oil, grit, excess coating, and other foreign matter. The circular rubber gasket must be flexed inward and inserted in the gasket recess of the bell socket.

A thin film of gasket lubricant must be applied to either the inside surface of the gasket or the spigot end of the pipe or both.

Gasket lubricant must be as supplied or recommended by the pipe manufacturer and approved by the Engineer.

The spigot end of the pipe must be centered in the bell and forced or pushed home. Smaller sizes of pipe can be pushed or forced into place by hand; larger sizes will require the use of mechanical assistance.

The condition of the trench bottom must be such that location and position of the pipe to be joined is in a straight line assuring a joint of maximum tightness and permanent seal.

#### C. Permissible Deflection in Push-On Joint Pipe

Whenever it is desirable to deflect push-on joint pipe, in order to form a long radius curve, the amount of deflection must not exceed the maximum limits shown in Table 3, unless recommended by the pipe manufacturer and approved by the Engineer.

TABLE 3  
PERMISSIBLE DEFLECTIONS IN PUSH-ON JOINT PIPE

Size of Pipe Inches	Max. Permissible Deflection Per Length - Inches		Approx. Radius of Curve Produced By Succession of Joints - Feet	
	18'	20'	18'	20'
3	19	21	205	230
4	19	21	205	230
6	19	21	205	230
8	19	21	205	230
10	19	21	205	230
12	19	21	205	230

14	11	12	340	380
16	11	12	340	380
18	11	12	340	380
20	11	12	340	380

### 3.14 JOINING HDPE PIPE

#### A. Butt Fusion

Sections of polyethylene pipe must be joined into continuous lengths on the jobsite above ground when possible. The joining method must be the butt fusion method and must be performed in strict accordance with the pipe manufacturer's recommendations. The butt fusion equipment used in the joining procedures must be capable of meeting all conditions recommended by the pipe manufacturer, including, but not limited to, temperature requirements of 400 - 450 degrees Fahrenheit, alignment, and an interfacial fusion pressure of 75 PSI. The butt fusion joining must produce a joint weld strength equal to or greater than the tensile strength of the pipe itself.

Qualifications of the fusion technician must be demonstrated by evidence of electrofusion training within the past year on the equipment to be utilized for this project.

#### B. Sidewall Fusion

Sidewall fusions for connections to outlet piping must be performed in accordance with HDPE pipe and fitting manufacturer's specifications. The heating irons used for sidewall fusion must have an inside diameter equal to the outside diameter of the HDPE pipe being fused. The size of the heating iron must be 1/4 inch larger than the size of the outlet branch being fused.

The qualifications of the fusion technician must be demonstrated by evidence of electrofusion training within the past year on the equipment to be utilized for this project.

#### C. Mechanical

Bolted joining may be used when connecting to other pipe materials. Flange joining must be accomplished by using a HDPE flange adapter with a ductile iron back-up ring. Mechanical joint joining must be accomplished with a molded mechanical joint adapter with a ductile iron mechanical joint gland.

#### D. Electrofusion

At locations shown on drawings or approved by the Engineer, electrofusion sleeves may be allowed where butt fusion is not possible.

Electrofusion joining must be done in accordance with the manufacturers recommended procedure and ASTM F 1290 and PPI TN 34. The electrofusion processor must be capable of reading and storing the input parameters and the fusion results for later download to a record file.

The qualifications of the fusion technician must be demonstrated by evidence of electrofusion training within the past year on the equipment to be utilized for this project.

E. Other

Socket fusion, hot gas fusion, threading, solvents, and epoxies may not be used to join HDPE pipe.

**3.15 ANCHORAGE**

A. Restrained Joint Pipe - Ductile Iron

The use of restrained joint pipe must be approved by the Owner. If approved, all ductile iron restrained joint pipe must be McWane Ductile “TR Flex”; American Ductile Iron Pipe “Lok-Ring Joint” or “Flex-Ring Joint”; or approved equal. All components of the restrained joint must be as manufactured, supplied, or recommended by the manufacturer of the restrained joint pipe system actually installed.

B. Joint Restraint Devices - Ductile Iron and PVC

Joint restraining glands must be EBAA Iron Sales “Megalug”, Ford “Uniflange Series 1400”, Tyler Union “Tuf-Grip Series 1000” or approved equal. Joint restraining glands must not be used to provide restraint to plain end fittings.

Joint restraining glands for PVC must be EBAA Iron Sales “Megalug Series 2000PV” for C900 and 19MJG for C909 or approved equal.

Restraint of PVC push on joints must be accomplished using Megalug Series 1900 restraint harness as manufactured by EBAA Iron Sales, Inc. or approved equal.

C. Anchorage for Plugs, Caps, Tees, Bends, and Valves - Ductile Iron and PVC

Unless otherwise specified or approved by the Engineer, movement of all plugs, caps, tees, bends, and valves must be prevented by use of restrained joint pipe or joint restraining glands. When joints are to be restrained with mechanical devices as noted above, all joints must be restrained for a minimum distance from the fitting as required in the following Table 4 (pipes larger than 20-inch must have restraint as shown on the drawings).

The use of joint restraining glands to provide restraint to plain end fittings is not an acceptable means of restraint and will not be allowed.

TABLE 4  
DUCTILE IRON PIPE RESTRAINT LENGTH REQUIRED, FEET\*

Pipe Diameter	Tees, 90° Bends	45° Bends	22-1/2° Bends	11-1/4° Bends	Dead Ends	Reducers (one size)	**
4"	23	9	5	2	57		
6"	32	13	6	3	82	43	63
8"	41	17	8	4	104	43	55
12"	58	24	12	6	149	80	120
16"	74	31	15	7	192	82	110
20"	89	37	18	9	233	82	104

**\*A multiplier of 1.43 must be used if the pipe is installed with polyethylene wrap and for PVC pipe.**

\*\*If the straight run of pipe on the small side of the reducer exceeds this value, then no restrained joints are necessary.

NOTE:

The length of restrained joint pipe required as shown in the table above is based on a bare ductile iron pipe with trench backfill being compacted to 95% of maximum unit weight in accordance with MDOT procedures.

All joints lying within the above minimum distances from the fitting must be restrained as noted herein.

Tees: Tees must be restrained in the branch direction as required in the table above. Also, to augment the above, in the straight through direction, the minimum length of the first pipe on either side of the tee must be ten (10) feet.

Bends: Bends must be restrained in both directions as required in the table above.

Valves: Valves used in conjunction with restrained joint pipe must be restrained in accordance with the recommendations of the manufacturer of the restrained joint pipe. All valves at crosses or tees must be restrained to the tee by use of restrained joint pipe or joint restraining glands as specified above.

Unstable Soils: Secure all fittings with restrained joint pipe or joint restraining glands throughout entire area of muck plus an additional length beyond the muck area in suitable soils for a distance in accordance with this section.

D. Reaction Backing (Thrust Blocks) - Ductile Iron and PVC

Reaction backing (thrust blocks) must be used only at locations indicated on the Drawings or approved by the Engineer.

Reaction backing must be poured-in-place concrete having a compressive strength of not less than 2,000 psi after twenty-eight (28) days. Backing must be placed between solid, undisturbed ground and the fitting to be anchored. The area of bearing on the pipe and on the ground in each instance must be that shown in the table below or directed by the Engineer. The backing must, unless otherwise shown or directed, be so placed that the pipe and fitting joints will be accessible for repair. Concrete must not be allowed to be placed around joint restraint devices. If concrete will be placed around fittings the fittings and joints must be wrapped in polyethylene encasement per Section 2.07 Item D.

Minimum Bearing Area against undisturbed trench wall, in square feet, for sand is indicated in Table 5 below. Details of placement are shown in Standard Details.

TABLE 5  
REACTION BACKING

Pipe Size	Tees, Plugs, Wyes, 45° Els	90° Els	Wyes, 22-1/2° Els or Less
6"	3	3	1
8"	4	6	2
10"	7	9	3
12"	9	11	3
16"	13	20	6
20"	20	28	8

Other Soil Conditions

Cement Sand or Hardpan	-	multiply above by 0.5
Gravel	-	multiply above by 0.7
Hard Dry Clay	-	multiply above by 0.7
Soft Clay	-	multiply above by 2.0

Muck – secure all fittings with restrained joint pipe or joint restraining glands, with concrete reaction backing the same as listed for sand conditions.

E. Restraint Collars - HDPE

HDPE pipe must have restraint collar(s) as shown in the locations and as detailed on the drawings. Restraint collars or restraining flanges may be required at locations where HDPE pipe connects to other pipe or when connecting to a manhole.

To limit the range of thermal expansion or contraction, HDPE force main must be in place and backfilled a minimum of 72 hours prior to installation of pipe restraint and connections to other pipes.

After the concrete collar has cured a minimum of 12-hours, Contractor must install compacted sand backfill around collar.

**3.16 CLEAN OUTS - DUCTILE IRON AND PVC**

Single and double clean outs must be constructed as shown on the standard detail or shown on the drawings. All pipe and fittings for the clean out must match the force main pipe, unless otherwise specified.

Unless otherwise specified, manhole castings must be EJ No. 1040 with Type A solid cover or approved equal.

### 3.17 AIR RELEASE VALVES

#### A. Air Release Valve

Air release valves must be as specified in the Project Specifications. Riser and fittings to be stainless steel, valves to be ¼ turn stainless steel ball valves. Location of air release valves must be as shown on the construction drawings.

#### B. Air Release Valve Manhole

Air release valve manholes for Ductile Iron and PVC/MPVC force mains must be constructed in accordance with the Standard Details and as specified herein. Air release valve manholes for HDPE force mains must be as detailed on the construction drawings and project specifications.

Precast bases must be installed on the subbase in such a way as to provide a uniform bearing under the manhole base.

Precast manholes with integral bottom may be used; however, any changes to the structure due to minor field adjustments in alignment and grade required to meet construction conditions, must be made by the Contractor at no additional cost to the Owner.

#### C. Flexible Manhole Connectors (Rubber Boots)

Flexible manhole connectors (also called rubber boots) must be "Kor-N-Seal" by National Pollution Control Systems, Inc., "P.S.X." or "Press Wedge II" by Press Seal Gasket Corporation, "Lock Joint Flexible Manhole Sleeve" by Inter Pace Corporation, "A-LOK," "Z-LOK," or "QUIK-LOK" by A-LOK Products, Inc. or approved equal. Flexible manhole connectors must conform to the requirements of ASTM Designation C923, Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals.

### 3.18 HYDROSTATIC TESTS

#### A. Procedure

All tests must be made by the Contractor using its own equipment, operators, and supervision, in the presence of the Engineer or its duly authorized representative. The length of the section to be tested must be as approved by the Engineer, or as shown on the drawings.

#### B. Air Removal Before Test

Before applying the specified test pressure, all air must be expelled from the pipe. If permanent air vents are not located at all high points, the Contractor must install corporation cocks at such points so the air can be expelled as the line is filled with potable water. After all the air has been expelled, the corporation cocks must be closed, and the test procedure may begin.

#### C. Hydrostatic Test - Ductile Iron

A leakage test must be conducted during the hydrostatic pressure test in the presence of the Engineer. The Contractor must furnish the pump, pipe, connections, gauges, and all other necessary apparatus, and must furnish the necessary assistance to conduct the test. The duration of the leakage test must be a minimum of two (2) hours and during the test the main must be subjected to a pressure of 150 psi. When several

valved sections are tested as one test, the maximum allowable leakage will be equivalent to the calculated allowable leakage for the smallest valved section therein.

Leakage must be defined as the quantity of water that must be supplied into the newly laid pipe, or any valved section thereof, to maintain the specified leakage test pressure after the air in the pipeline has been expelled, and the pipe has been filled with water. No pipe installation will be accepted if the leakage is greater than that determined by the formula:

$$L = \frac{SD\sqrt{P}}{148,000}$$

Where:

L = Allowable leakage in gallons per hour

S = Length of pipe tested, in feet

D = Nominal diameter of the pipe, in inches

P = Average test pressure during the leakage test, in pounds per square inch gauge.

This formula is based on allowable leakage of 10.49 gallons per day, per mile of pipe, per inch of nominal diameter at 150 psi.

The Owner must be furnished a written report of the results of the leakage test that identifies the specific length of pipe tested, the pressure, the duration of the test, and the amount of leakage. The report must be signed by the Contractor and the Engineer.

D. Hydrostatic Test - HDPE Pipe

The hydrostatic test procedure for HDPE pipe must conform to ASTM F2164. Testing must be performed with the pipe in the trench following backfill placement. Subject the lowest element in the system to a test pressure that is 1.5 times the design pressure or a minimum of 100 psi, whichever is greater, and check for any leakage.

The test procedures consist of two steps: the initial expansion and the test phase. When test pressure is applied to a water-filled pipe, the pipe expands. During the initial expansion of the pipe under test, sufficient make-up water must be added to the system as needed for up to four (4) hours to maintain the test pressure. After four (4) hours, initial expansion should be complete, and the actual test can start.

After four (4) hours of maintaining pressure as described above, the pressure must then be dropped by 10 psi. At this point do not increase pressure or add make-up water. If the pressure then remains within five (5%) percent of the target value for one (1) hour, this indicates there is no leakage in the system.

Note: Under no circumstances must the total time under test exceed eight (8) hours at 1½ times the system pressure rating. If the test is not complete within this time limit (due to leakage, equipment failure, etc.), the test section must be permitted to “relax” for eight (8) hours prior to the next test sequence.

E. Variation from Permissible Leakage or Pressure Loss

If any test of pipe laid discloses leakage or pressure loss greater than that specified above, the Contractor must at its own expense locate and repair the leaks until the leakage or pressure drop is within the specified allowance. All visible leaks must be repaired regardless of the allowance used for testing.

F. Time for Making Test

The pipe may be subject to hydrostatic pressure and inspected and tested for leakage at any convenient time after the trench has been partially backfilled. Where any section of the main is provided with concrete reaction backing or restraint blocks, the hydrostatic pressure test must not be made until at least seven (7) days have lapsed after the concrete was installed. If high-early-strength cement is used, the hydrostatic pressure test must not be made until at least two (2) days have elapsed.

**3.19 BORE & JACK**

A. Casing Installation

A casing pipe must be jacked into place and a carrier pipe installed within the casing pipe. The casing pipe must be jacked into place by method approved by the authority having jurisdiction over the facility affected.

Bore and Jacking (Horizontal Auger Boring) or Pipe Jacking with a Tunnel Boring Machine (TBM) are acceptable methods; however, method of casing installation must also be approved by the authority having jurisdiction over the facility affected.

Prior to casing pipe installation, Contractor must field verify size, material, alignment, and depth of existing utilities within the influence of the installation. Contractor must coordinate with Owner, Engineer, Road Commission, Railroad, and MDOT as they apply regarding jurisdiction if adjustments to casing alignment are required.

Bore operations must progress on a 24-hour basis without stoppage until the leading edge of the pipe has reached the receiving pit.

The front of the casing pipe must be provided with mechanical arrangements or devices that will prevent unsupported excavation ahead of the pipe.

The face of the cutting head must be arranged to provide a reasonable obstruction to the free flow of soft or poor material into the casing pipe. The cutting head must be able to be removed in the case of an obstruction.

Casing grade vertical tolerance is +/- 0.1 feet and horizontal tolerance is 0.5 feet from design line and grade. Contractor must continuously monitor and plot grades during casing installation and notify Engineer immediately if grades drift from specified tolerances. Method of monitoring is subject to the authority having jurisdiction over the facility affected.

Subsidence monitoring is required. Degree of monitoring is subject to the authority having jurisdiction over the facility affected. Subsidence monitoring must be performed in a manner that will minimize the movement of the ground in front of, above, and surrounding the horizontal auger bore operation; and will minimize subsidence of the surface above and in the vicinity of the boring. The ground must be supported in a manner to prevent loss of ground and keep the perimeter and face of the boring stable at all times, including during shutdown periods.

A survey must be performed one day prior to initiating this operation at each required monitoring location. A similar survey must then be performed at each location, on a daily basis, until the permitted activity has been completed. At minimum, Contractor must measure and record baseline location (northing, easting, elevation) of critical surface features (top of rail, edge of paved surface, center line of paved surface, etc.) along the top of proposed casing alignment and within 10' either side of the casing

alignment. Baseline measurements must be taken prior to any dewatering within the influence of the crossing. Following initiation of dewatering, Contractor must take the same measurements daily until the permitted crossing and dewatering has been completed. All survey readings must be recorded to the nearest one-hundredth (0.01) of a foot. Digital photographs of the pavement and rail conditions must also be taken prior and after the pipe installation.

B. Carrier Pipe Installation

The carrier pipe must be joined together to form a continuous run through the casing. Carrier pipe must be supported on casing spacers securely fastened to the pipe.

After the pipe has been inspected and accepted, the annular space between the pipe and the casing will be filled with flowable fill. Contractor must vent casing and monitor CLSM pressures as necessary to prevent collapse of the pipeline. Contractor may fill the carrier pipe with water prior to CLSM installation. After the casing has been filled, the ends of the casing must be sealed.

### 3.20 HORIZONTAL DIRECTIONAL DRILLING

A. Horizontal directional drilling (HDD) is a method of trenchless construction using a surface launched steerable drill tool controlled from a mobile drilling frame, and includes a field power unit, drilling fluid mixing system, and mobile spoils extraction system. The work generally consists of three phases:

1. Drilling a pilot hole from the surface of pit at a starting point to an exit pit at the surface beyond the obstacle or area that is to be avoided.
2. Reaming the pilot hole to make it large enough for the pipeline to be installed.
3. Pipeline is pulled into place. During the pipe pulling operation, drilling fluid (a bentonite, water, and polymer solution) is injected to stabilize the hole, remove cuttings, and lubricate the pipe.

B. Coordination

1. Drilling operations must not interfere with, interrupt or endanger surface features or surface activities.
2. When rock stratum, boulders, underground obstructions, or other soil conditions that impede the progress of drilling operation are encountered, the Contractor and Engineer must review the situation and jointly determine the feasibility of continuing drilling operations, making adjustments or switching to an alternative construction method.
3. The Contractor must familiarize themselves with the geologic characterization of the soil stratum at the proposed drilling path. The Contractor must be responsible for informing the Engineer of any changes that are required in the directional drilling procedure due to geologic conditions.
4. Launching and recovery pits must be as small as practical. Dewatering of pits and excavations must be done in accordance with these specifications. When groundwater is encountered, the Contractor must provide a dewatering system of sufficient capacity to keep any excavation free from water until the backfill operation is in progress. Dewatering must be performed in a manner that removal of soil particles is held to a minimum. Water from the dewatering

system must be desilted before discharge. Methods of dewatering and desilting, including all costs, must be the Contractor's responsibility and are included in the Horizontal Direction Drilling pay item.

5. Utilities shown on the plans are approximate. In areas where there is a potential conflict, the Contractor must dig up and verify the locations and elevations of the utilities at no additional expense to the City. The Contractor must assume full responsibility for the protection of all utilities, structures and their foundations which may be affected by the work.
6. Before beginning the drilling process, the Engineer must stake the proposed drill path.

C. Drill Path Survey

1. The drill path must be walked in the presence of the Engineer and the Contractor with the guidance system that must be used for each segment of the drill path. The Contractor must locate and record any surface and subsurface magnetic variations or abnormalities and all points of interference, as well as verifying all utility locations and corresponding utility maps. Should any discrepancies arise between utility maps, field locations and guidance system findings, the Contractor must clarify all discrepancies prior to beginning drilling operations. The drill path survey must be performed no earlier than two days prior to commencing drilling operations. Provide the Engineer 48-hour notice of drill path survey.

D. Equipment

1. The drilling equipment must be capable of placing the pipe within the planned line and grade without inverted slopes.
2. The drilling equipment must be capable of pulling product pipe from either the downstream or upstream pit locations. The equipment must be adequately sized for the application.
3. The guide system must have the capability of measuring inclination, roll and azimuth. The guidance system must have an independent means to ensure the accuracy of the installation. The Contractor must demonstrate a viable method to eliminate accumulated error due to the inclinometer (pitch or accelerometer). The guidance system must be capable of generating a plot of borehole survey for the purpose of a record drawing. The guidance system must meet the following specifications:

Inclination:	Accuracy	+0.05
	Range	+90
	Repeatability	+0.02
Roll:	Accuracy	+0.05
	Range	+90
Azimuth	Accuracy	+0.05
	Range	+90

4. Equipment setup requirements at the launch and recover locations must be determined by the Contractor in accordance with the plans and must be submitted to the Engineer prior to commencement of drilling operations.

- E. Pilot Hole Drilling
1. The entry angle of the pilot hole and the drilling process must maintain a curvature that does not exceed the allowable bending radii of the carrier pipe per the manufacturer's recommendations.
- F. The Contractor must follow the pipeline alignment as shown on the Plans, within the specification requirements. The location and depth of the drill head in relation to the profile and center line of the alignment must be determined at a maximum of ten-foot intervals. Acceptable tolerance must be 0.5 feet variation from the center line of pipe in both vertical and horizontal directions (1-foot tolerance window).
- G. In the event of difficulties at any time during drilling operation requiring the complete withdrawal from the tunnel, the Contractor will be allowed to withdraw and abandon the tunnel and begin a second attempt at a different location. The alternate location must be approved by the Engineer before the Contractor withdraws.
- H. Access pits must be at the beginning and end segments shown on the Plans. Intermittent pits must be approved by the Engineer prior to proceeding with drilling operations. No intermittent access pits must be allowed in Railroad Right-of-ways.
- I. Installing the Carrier Pipe
1. After the pilot hole is completed, the Contractor must install a swivel to the reamer and commence pullback operations.
  2. Reaming diameter must not exceed 1.5 times the diameter of the carrier pipe being installed.
  3. The carrier pipe being pulled into the tunnel must be protected and supported so that it moves freely and is not damaged by stones and debris on the ground during installation.
  4. Pullback forces must not exceed the allowable forces for the carrier pipe.
- J. The Contractor must allow sufficient lengths of carrier pipe to extend past the termination point to allow connections to adjacent pipe sections, tees, or fittings. Pulled pipe must be allowed 24 hours of stabilization prior to making tie-ins. The length of extra carrier pipe must be at the Contractor discretion.
- K. Field Inspection
1. All pipe sections, specials, and jointing materials must be carefully examined for defects and no piece must be laid that is known to be defective. Any defective piece discovered installed must be removed and replaced with a sound one in a manner satisfactory to the Engineer at the Contractor's expense.
  2. Defective material must be marked with an "X" in pink paint and must be removed from the job site.
- L. Drilling Fluid Containment and Disposal Requirements
1. The Contractor must contain, handle, and dispose of drilling fluids in accordance with the following requirements:
    - a. All drilling fluid and fluid additives must be disclosed, and Material Safety Data Sheets (MSDS) must be provided to the permit agency and the Engineer upon request.

- b. Excess drilling fluid must be confined in a containment pit at the entry and exit location until recycled or removed from the site.
- c. Precautions must be taken to ensure that drilling fluid does not enter the roadways, streams, municipal storm or sanitary sewer lines, and/or any other drainage system or body of water.
- d. When installing below railroads, vents must be installed on either side of the railroad tracks to direct any excess drilling fluid to a containment area and to prevent unintended surfacing of drilling fluid within the Railroad Right-of-way.
- e. Unintended surfacing of drilling fluid must be contained at the point of discharge and recycled or removed from the site.
- f. Drilling fluids that are not recycled and reused must be removed from the site and disposed at an approved disposal site.
- g. Drilling fluids must be completely removed from the construction site prior to backfilling or restoring the site.

### **3.21 REMOVAL OF SURFACE IMPROVEMENTS**

Surface improvements such as sidewalks, improved lawns, drives, curb and gutter, and all types of pavement must be removed just prior to excavating or trenching operations. All improvements must be cut at the expected trench width prior to excavating using suitable equipment which does not damage the improvement outside of the trench area.

Concrete and bituminous pavement and drives must be cut with a pavement cutting saw. The depth of the cut must be the full depth of the pavement. Pavement crushers or breakers of any type are prohibited unless specifically authorized by the Engineer. Pavement which is removed must not become mixed with backfill material. Power equipment may be used for pavement removal, provided that damage is not caused to improvements which are to remain.

Removal of surface improvements must be included in the major items of work and no specific payment will be made therefore unless specific Proposal items are provided, in which case the prices bid must be payment in full for performing this work as specified herein.

### **3.22 EXISTING SOIL / SUBSURFACE CONDITIONS**

Where provided, the soil borings shown on the construction drawings are being furnished for the convenience and general information only. The data shown on the boring logs represents soil and ground water conditions encountered at the respective boring locations at the time of boring. Variations may occur between these locations. Additionally, the stratigraphic lines represent the approximate boundaries between soil types; however, transitions may be more gradual than what is shown. The Contractor will be responsible for making themselves familiar with subsurface conditions by whatever means they deem necessary and shall make their own determinations therefrom.

### **3.23 EXISTING UNDERGROUND UTILITIES & STRUCTURES**

#### **A. Location**

No less than three (3) working days prior to excavating, the Contractor is to call "MISS DIG" at 1-800-482-7171 or 811. Existing utilities are shown only at their approximate locations based on information and data furnished to the Engineer by the owners of such underground facilities. Neither the Engineer nor the Owner

guarantees the accuracy or completeness of any such information or data. The Contractor shall be solely responsible for determining their exact elevations and location in the field. The Contractor must notify the owners of all underground utilities before starting any work. House sewer connections, water and gas services, and other utility lines may not be indicated on the drawings. However, the Contractor must make every effort to locate all underground utilities from information obtained from the utility owner or by prospecting in advance of trench excavation.

B. Replacement

Certain underground utilities such as sewers may require removal and subsequent replacement in lieu of supporting or bracing during the proposed construction, or the Contractor may elect this option when temporary provisions to maintain essential services have been previously approved by the Engineer.

Unless otherwise specified, any utilities removed during the proposed construction must be replaced by the Contractor. Materials and installation must be equal to or better than original construction in every way. Salvaged materials may be reused when they are in good condition, and a satisfactory installation can be accomplished in the judgment of the Engineer.

Replacement of existing utilities must be considered included in the major items of work unless specific items have been provided in the Proposal, in which case the prices bid must be payment in full for performing this work as specified herein.

C. Relocation

Should any pipe or other existing utility require raising or lowering or moving to another location because of interference with the pipe or structure being constructed under these specifications, such changes which in the opinion of the Engineer are necessary must be made by the Contractor unless otherwise specified. Relocation of the utility shall be coordinated with the utility owner and comply to their requirements. Relocation of existing utilities must be included in the major items of work unless specific items are provided in the Proposal.

D. Reconnection

Where lateral services, house connections, or other pipelines require reconnection to the proposed utility, as is the case when an existing utility is being reconstructed, the Contractor must make these connections as specified or as shown on the drawings. All costs for making these connections, including provisions for maintaining flows and providing temporary service during the proposed construction, must be included in the major items of work unless specific items are provided in the Proposal.

E. Utilities to be Abandoned

When pipes, conduits, sewers, or other structures are removed from the trench leaving dead ends in the ground, such ends must be fully plugged or sealed with brick and mortar by the Contractor to obtain a soil-tight condition. Abandoned structures such as manholes or chambers must be entirely removed unless otherwise specified or shown on the drawings.

All materials from abandoned utilities which can be readily salvaged must be removed from the excavation by the Contractor and stored on the site or loaded on the Owner's truck as directed by the Engineer. Owner must have first claim to

salvageable materials. The Contractor is responsible to dispose of salvageable materials not desired to be kept by the Owner.

All costs for abandoning utilities and for removing and salvaging materials, when required, must be considered included in the major items of work unless specific items have been provided in the Proposal, in which case the prices bid must be payment in full for performing this work as specified herein.

### **3.24 EXCAVATING & TRENCHING**

#### **A. General**

Excavating and trenching operations must at all times be conducted in a safe, orderly manner using methods and equipment designed and suited to the intended use by personnel experienced in the work being performed.

None of the requirements or provisions specified herein or shown on the drawings must nullify or restrict any safety provisions required by any regulation or law governing the protection and/or safety of persons or property.

#### **B. Width of Trench**

The width of the trench must be ample to permit the pipe to be laid and joined properly and the pipe embedment material and backfill to be placed and compacted per pipe manufacturer's recommendations. Trenches must be of sufficient extra width when required as will permit the convenient placing of trench supports, sheeting, and bracing.

When the trench width above the top of the pipe is appreciably greater than that which is reasonably required by project conditions in the judgment of the Engineer, any additional cost for backfill material, surface restoration, or other items that are the result of such excess width must be borne by the Contractor.

When installing pipes in areas of rock, refer to section 2.06.05 for minimum trench clearance.

##### **1. Width of Trench for Rigid Pipe:**

In order to limit excessive loads on rigid pipe, the maximum width of trench for pipe 36 inches and larger in diameter must not be more than twice the nominal diameter. For smaller sizes of pipe, the maximum width of trench must be not more than 3 feet greater than the nominal diameter of the pipe except as otherwise specified or directed. The above limiting restrictions on trench width apply from outside bottom of pipe to outside top of pipe.

Where the width of trench within these limits exceeds the maximum limit specified, the Contractor must install a heavier class of pipe or use other means to provide additional load-carrying capacity at no additional cost to the Owner. Any changes in class of pipe or other variation must be approved in writing by the Engineer before the work progresses.

##### **2. Width of Trench for Flexible Pipe:**

Unless otherwise specified or approved by the Engineer, the minimum width of trench must be per pipe manufacturer's recommendation based on the pipe material, native soil conditions, and selected embedment material, or the minimum width to achieve specified compaction, whichever is greater.

C. Excavating to Grade

The trench must be excavated to a depth required for the proper installation of the pipe and placing of the pipe embedment material as specified.

Any part of the bottom of the trench excavated below the specified subgrade must be refilled with approved materials compacted to 95% of maximum unit weight in accordance with MDOT procedures at no additional cost to the Owner. If additional excavation is required to correct unstable foundation conditions, payment will be made as specified in Section 2.07.

D. Sheeting, Shoring, Bracing, & Shelving

1. General:

The Contractor must brace or slope back the sides of all excavations in accordance with current MIOSHA regulations. The Contractor must be responsible for compliance to such regulations and for the design, installation, and maintenance of all excavation safety measures.

**3.25 DEWATERING**

The Contractor must provide and maintain adequate dewatering equipment to remove and dispose of all surface and groundwater including water or sewage from exposed sewers or water mains, from all excavations and trenches, or other parts of the work. Each excavation must be kept dry during the preparation of the subgrade and continually thereafter until the structure to be built or the installation of the pipeline is completed to such extent that no damage from hydrostatic pressure, flotation, or other cause will result.

Where work is in soil containing an excessive amount of water, the Contractor must provide, install, and maintain suitable well points or wells connected to manifolds or reliable pumping equipment, or other suitable groundwater dewatering methods, and must so operate the dewatering system to ensure proper construction of the work.

Contractor must submit a groundwater dewatering plan to the Owner. The plan must include the proposed dewatering strategy, including anticipated discharge rate(s) and location(s). Trench underdrain systems, or similar, will require additional information subject to project specific requirements. Discharge of water from groundwater dewatering operations shall be in accordance with all Federal, State and Local requirements, including discharge rate limitations. The Contractor must filter groundwater dewatering discharge and make every effort to prevent sand, sediment, or debris from entering any existing pipeline or conduit which they may use for drainage purposes.

The repair or cleaning of drainage structures made necessary by the Contractor's operations must be performed by and at the expense of the Contractor. Arrangements for discharge of groundwater into any public sewer must be previously approved by the Owner of the receiving sewer. Should the Contractor identify potential contamination in the water from the groundwater dewatering operation, via visual and/or odor, the Contractor shall immediately notify the Engineer.

Dewatering including the use of stone or gravel for dewatering purposes when required will not be paid for separately but will be included in the contract price for the major items of work.

The Contractor must limit the dewatering operation to the minimum time and depth required for construction. The Contractor will be required to furnish temporary water service and/or

provide potable water at the direction of the Engineer to property owners whose wells are affected by the dewatering operations.

### **3.26 SUBGRADE**

The subgrade for pipe and/or structures must be firm, dense, and thoroughly compacted and consolidated, free from mud and muck, and sufficiently stable to remain firm and intact underfoot.

#### **A. Unstable Foundation**

When the soil beneath the normal pipe embedment area is soft or unstable, even with adequate dewatering, or in the opinion of the Engineer cannot support the pipe or utility, further depth must be excavated and refilled to the proposed grade with MDOT Class II granular material (for plastic pipe the material must comply with ASTM D2321) compacted in twelve (12) inch layers to 95% of maximum unit weight in accordance with MDOT procedures, or other approved means must be employed to assure a firm foundation for the utility. The volume of unstable foundation removed and replaced with approved materials for which payment will be allowed will be determined in cubic yards of material, compacted in place, unless otherwise specified on the drawings or in the proposal. Volume will be based on the actual width and depth of material removed and replaced, subject to Engineer review and approval.

### **3.27 PIPE EMBEDMENT**

#### **A. General**

Pipe embedment must include the furnishing and placing of approved materials as specified or as directed from 4 inches under the outside bottom of the pipe to 12 inches over the outside top of the pipe. Various classes of pipe embedment may be specified or shown on the drawings or details in which case the limits of the various types will also be specified.

#### **B. Flexible Pipe Embedment**

Flexible pipe is any pipe having a pipe stiffness of less than 60 psi. as defined under the requirements of ASTM Designation D2412 (this includes all plastic pipe except Composite (Truss) pipe, and may include corrugated metal pipe, ductile iron pipe, and steel pipe, depending on pipe diameter and wall thickness).

### **3.28 PLACING PIPE EMBEDMENT MATERIAL**

Pipe embedment material must be placed in the bottom of the trench and shaped by hand to provide a firm and uniform bearing for the barrel of the pipe with additional shaping to accommodate the bells on bell and spigot pipe. After each pipe has been graded, aligned, and placed in final position on the bedding material and jointing is complete, additional embedment material must be carefully placed, not exceeding 6-inch lifts, and compacted under and around each side of the pipe and over the pipe until it is completely covered by 12 inches of embedment material. Said material must be distributed along both sides of the pipe uniformly and simultaneously to prevent lateral displacement of the pipe. All granular embedment material must be compacted to 95% of maximum unit weight in accordance with MDOT procedures.

All the work of placing pipe embedment must be considered an integral part of installing the pipe and must be completed immediately after the pipe is laid to the correct alignment and grade.

### **3.29 BACKFILLING ABOVE PIPE EMBEDMENT**

#### **A. General**

All backfill material must be free from cinders, ashes, refuse, sod, organic material, boulders, or rocks larger than 3 inches in diameter, frozen material or other material which in the opinion of the Engineer is unsuitable. The soil excavated from the trenches must be used for backfilling when it is classified as suitable by the Engineer. If all or a portion of the excavated material is classified as unsuitable for backfilling, the Contractor must remove and dispose of the unsuitable material and must furnish and place granular material meeting the requirements of Section 902.07 of the MDOT 2020 Standard Specifications for Construction for Granular Material Class II.

All backfilling and compaction must be performed by the Contractor using methods and equipment approved by the Engineer.

#### **B. Trenches Requiring Compacted Granular Backfill**

Trenches and excavations in the following locations must be backfilled with approved granular material meeting the requirements of Section 902.07 of the MDOT 2020 Standard Specifications for Construction for Granular Material Class II:

1. Improved areas, including drives, sidewalks, parking areas, around structures, etc.
2. Within the limits of the roadway (within a 1 on 1 slope beginning two (2) feet from the edge of pavement or back of curb towards the right-of-way line).
3. Within the limits of future improvements (shown on Drawings).
4. Within limits specified on Drawings.
5. All sanitary sewer lateral trenches within the limits of the right-of-way.

All backfill within these areas must be placed in layers not exceeding twelve (12) inches thick and must be compacted to 95% of maximum unit weight in accordance with MDOT procedures. Trenches transverse to undisturbed roadway shall be compacted to 98% of maximum unit weight in accordance with MDOT procedures. Tests for compaction will be made by the Engineer or other representative designated by the Engineer at no cost to the Contractor. When tests indicate a density which is less than that required, the methods or equipment being used must be modified to obtain the density specified, and the section in question must be recompacted until the required density is obtained. The cost of retesting must be borne by the Contractor.

#### **C. Trenches Not Requiring Compacted Granular Backfill**

Where not otherwise specified or directed, backfilling above the pipe embedment must be made with material which is originally excavated, which is suitable. Backfill materials must be consolidated by mechanical equipment working longitudinally in the trench, or by other approved methods, so as to be free of large voids with any excess material mounded over the trench or removed as directed by the Engineer. The trench must be graded to a reasonable uniformity and left in a neat condition.

### **3.30 DISPOSAL OF EXCESS EXCAVATION**

All excavated material in excess of that needed for backfill or that material classified as unsuitable by the Engineer must be disposed of by the Contractor. However, the Engineer

reserves the right to direct the Contractor to haul all or a portion of the material not required for backfilling to an area designated by the Engineer which is not more than 1,000 feet outside the project and which is reasonably accessible. This work, when directed, must be performed at no additional cost to the Owner.

**3.31 LIMITATIONS ON OPERATIONS**

The Contractor must at all times conduct their work so that there is a minimum of inconvenience to the residents and businesses in the vicinity of this project. To this end, the Contractor must complete their backfill and remove all debris and unsuitable backfill to a point as close to the actual pipe installation as is practical and keep the area where the pipe construction and backfill has been completed in a neat condition. Open excavations must be protected by signs, lights, barricades, and/or fence at all times when work is not actually taking place at that excavation. The placement of excavated earth along the line of the trench must be controlled by the public's use of the street or right-of-way and must always be confined to approved limits.

Not more than 300 consecutive feet of street must be closed at one time, and vehicular traffic through any street must not be stopped for a period longer than two weeks without the written permission of the Engineer. Not more than one cross street must be closed to vehicular traffic at the same time except by permission of the Engineer. Contractor must maintain access for emergency vehicles at all times.

**3.32 RESTORATION**

A. Description of Work

All areas disturbed by construction operations must be reconstructed per the Drawings. Disturbed areas with no specific reconstruction plans must be restored to the original condition thereof as determined by the Engineer using information from drawings, surveys, and photographs or video when available.

The work must be performed in accordance with the Drawings and the MDOT 2020 Standard Specifications for Construction

B. Earthwork

All streets, walks, and other improved surfaces disturbed by construction operations must be replaced to uniform lines and grades established by the Engineer. The finish grade line will be established within three (3) inches of the existing ground profile shown on the Drawings unless a proposed grade is shown which indicates otherwise.

The Contractor must perform all grading, compacting, shaping, and related work required to prepare the subgrade to the satisfaction of the Engineer.

**PART 4 MEASUREMENT AND PAYMENT**

**GRAVITY SEWER**

**4.01 GENERAL**

All proposed construction will be measured for payment by the Engineer in accordance with the items listed in the Proposal.

The unit price bid for each Proposal item must be payment in full for completing the work, ready for use as specified.

#### **4.02 SANITARY SEWERS**

Measurement of the length of the sewer will be in lineal feet along the center line of the sewer from center of manhole to center of manhole.

Where depth classifications are provided, the depth of the sewer connecting two adjacent structures will be considered as being the average of the depth from earth grade to the sewer invert at these structures.

Unit price for sanitary sewer includes all specified acceptance testing.

#### **4.03 MANHOLES**

Manholes will be paid for in accordance with the units established in the Proposal. When no Proposal item is provided for castings, the castings and their installation are considered part of the major items of work.

#### **4.04 SANITARY SEWER LATERALS**

The length of sewer laterals will be measured horizontally from the center of the main sewer to the end of the lateral as specified and must include wyes and all lateral risers.

#### **4.05 SANITARY SEWER TAP AND SANITARY MANHOLE TAP**

Sanitary Sewer Tap and Sanitary Manhole Tap, \_\_ inch shall be measured per unit installed based on the size of the connecting sewer pipe.

#### **4.06 STUBS**

Stubs are considered part of the major items of work and no specific payment will be made therefor.

### **FORCE MAIN SEWER**

#### **4.07 GENERAL**

All proposed construction will be measured for payment by the Engineer in accordance with the items listed in the Proposal.

The unit price bid for each Proposal item will be payment in full for completing the work, ready for use as specified.

#### **4.08 FORCE MAIN: OPEN CUT**

Measurement of the length of the force main will be in feet along the center line of the force main. Payment of locator wire furnishing, installation and testing must be included in the Force Main item.

The Payment of locator wire furnishing, installation and testing must be included in the Force Main item.

#### **4.09 FORCE MAIN: HDD**

Measurement of the length of the force main installed by HDD will be in feet along the center line of the force main. Payment for pipe required for entry and exit pits shall be included as part of the major items of work.

The Payment of locator wire furnishing, installation and testing must be included in the Force Main item.

#### **4.10 FITTINGS**

When a specific item is provided in the Proposal for Bends, Tees, or Wyes, the unit price bid must be the additional cost of furnishing and placing the Bend, Tee or Wye over and above the cost of furnishing and laying the force main.

When no Proposal item is provided, the work must be incidental to the major items of work.

#### **4.11 VALVES**

Valves will be measured as single units and must include valve box, joint restraint, and other materials as required for installation of the valve and valve box.

#### **4.12 THRUST BLOCKS AND RESTRAINT COLLARS**

Thrust Blocks and Restraint Collars will be measured as single units and must include all concrete, steel reinforcement, wall anchors or restraint fins, and labor.

When no Proposal item is provided, the work must be considered part of the major items of work.

#### **4.13 CLEANOUTS**

Sanitary cleanouts shall be measured per unit installed and include the riser pipe, plug/cap, and any additional items as detailed on the drawings. Connection to the existing service shall be considered incidental to construction and will not be paid for separately.

#### **4.14 AIR RELEASE VALVES**

Air release valves will be paid for in accordance with the units established in the Proposal and must include furnishing and installing the precast manhole in accordance with the standard detail.

#### **4.15 LOCATOR WIRE AND MARKING POSTS**

Locator wire will be considered included in the cost of the force main pipe. Marking posts will be paid in accordance with the units established in the Proposal and must include furnishing and installation of the marking posts and test stations.

### **SUBGRADE**

#### **4.16 UNSTABLE FOUNDATION**

Payment for removal, disposal and replacement of unstable foundation will be paid under the contract provisions for extra work, unless specific Proposal items have been provided, in which case, the unit price bid must be payment in full for performing the work as specified. If the soil in the bottom of the trench is soft due to excessive amounts of groundwater, and/or the Contractor's method of operation, stabilization of the trench bottom must be at the Contractor's expense.

#### **4.17 SPECIAL BACKFILL**

When an item has been provided in the Proposal for Special Backfill, approved granular material obtained off the site which is required by these specifications or authorized by the Engineer must be included in this item. Special backfill will be measured compacted in place. The Contractor must furnish a delivery ticket for each truck load at the time the material is delivered to the project. The delivery ticket must be prepared at least in duplicate, one copy of which must be furnished to the Engineer or their representative, and the other copy to be retained in the Contractor's file. No payment will be made for special backfill unless the

individual truck delivery tickets are furnished in this manner. The Engineer will use the delivery tickets when calculating the compacted in place quantity.

The Proposal unit price per cubic yard for special backfill must include payment in full for furnishing, placing, and compacting the special backfill and for disposing of the material excavated from the trench as directed and in accordance with the drawings and specifications.

Stone used specifically for dewatering procedures must not be classified as special backfill and no specific payment will be made therefore.

#### **4.18 DISPOSAL OF EXCESS EXCAVATION**

All excavated material in excess of that needed for backfill or that material classified as unsuitable by the Engineer must be disposed of by the Contractor. However, the Engineer reserves the right to direct the Contractor to haul all or a portion of the material not required for backfilling to an area designated by the Engineer which is not more than 1,000 feet outside the project, and which is reasonably accessible. This work, when directed, must be performed at no additional cost to the Owner.

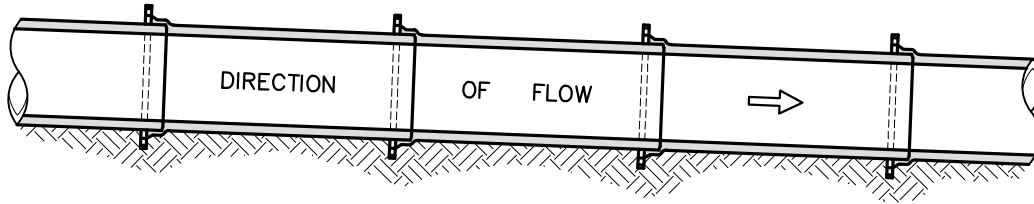
### **GENERAL**

#### **4.19 ADJUSTING DRAINAGE STRUCTURE, CASE 1, MODIFIED**

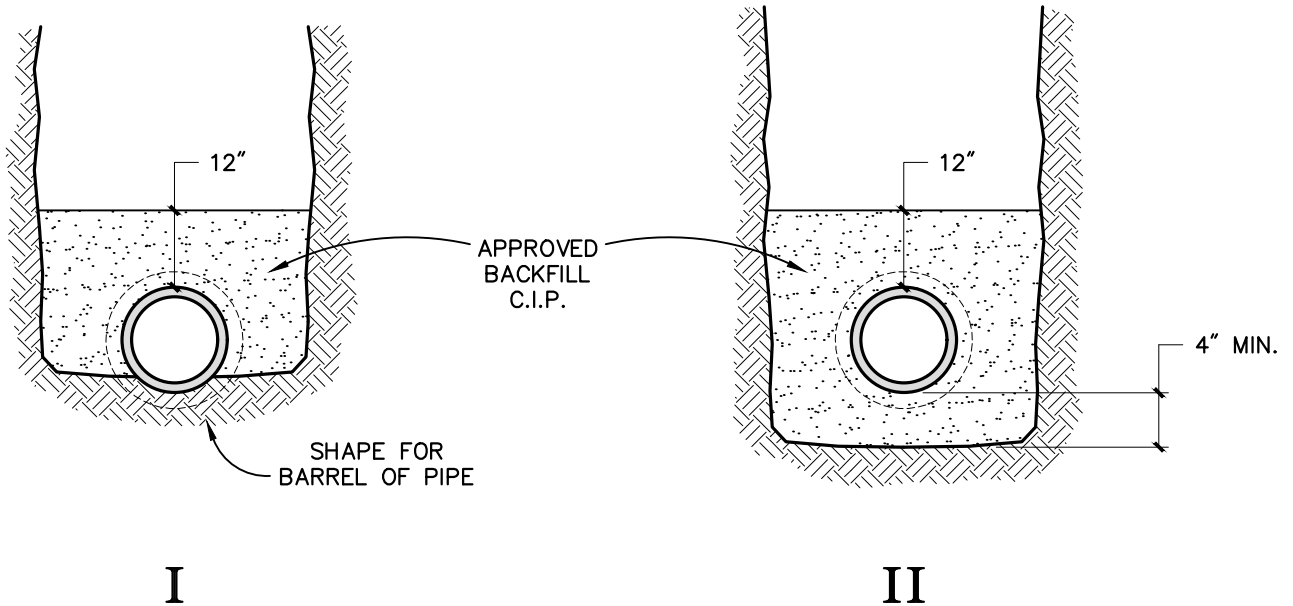
Dr Structure Cover, Adj, Case 1, Modified includes furnishing all materials, saw cutting, removal and disposal of existing pavement and curb or curb and gutter, adjustment of cover to required elevation and cross-slope, installation of epoxy anchored lane ties and epoxy coated circular bars, placement and finishing of new curb or curb and gutter, placement and finishing of new concrete and HMA, placement and removal of temporary HMA wedging for maintaining traffic, if required, placement of cover on open structures to prevent accumulation of debris and cleaning existing drainage structures due to Contractor operations.

#### **4.20 STEEL CASING PIPE**

Steel Casing Pipe, \_\_ inch, jacked in place of the size required will be paid for by the length installed. Steel Casing Pipe, \_\_ inch, jacked in place includes the cost of excavating the pits, providing and installing sheeting, bracing, and any other safety devices, providing jacking equipment, drainage and dewatering, bulkheading and sealing the casing, providing and installing vents, grouting the annular space between the casing and native soil and any other items associated with the operation.



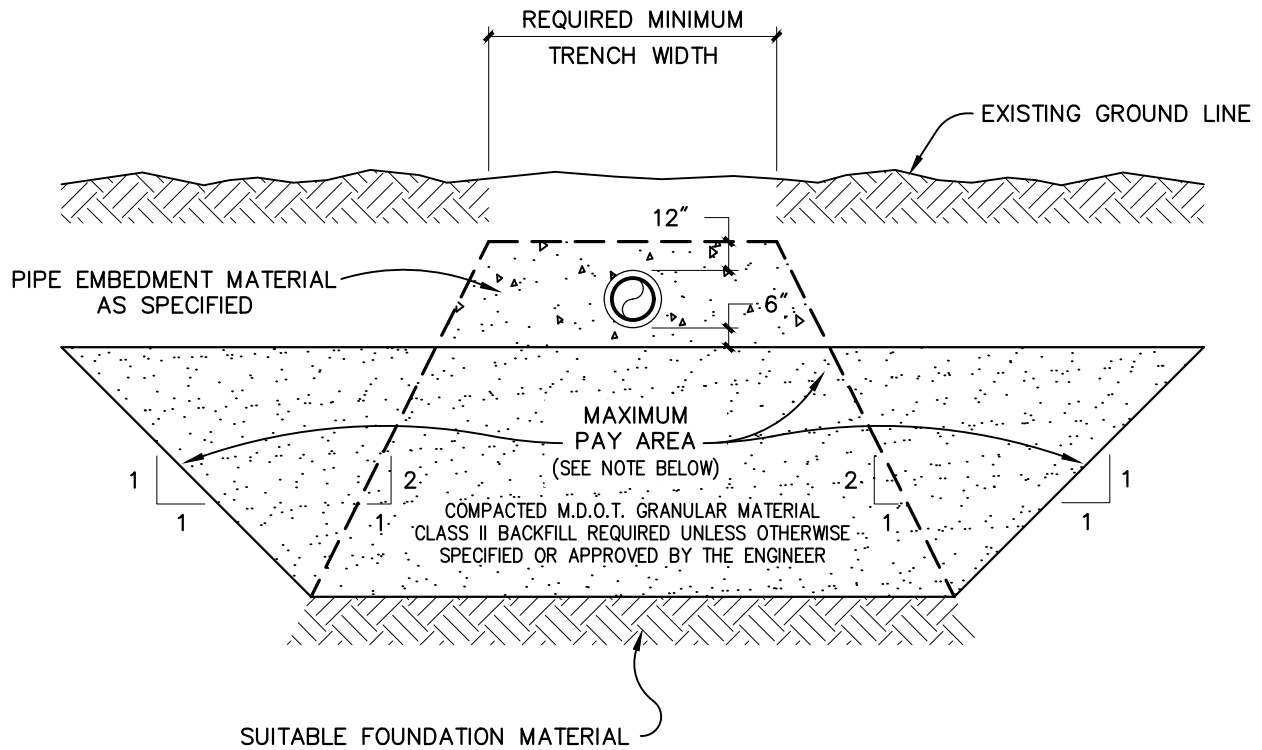
## EXCAVATION FOR BELLS



## CLASS B PIPE EMBEDMENT

### NOTES

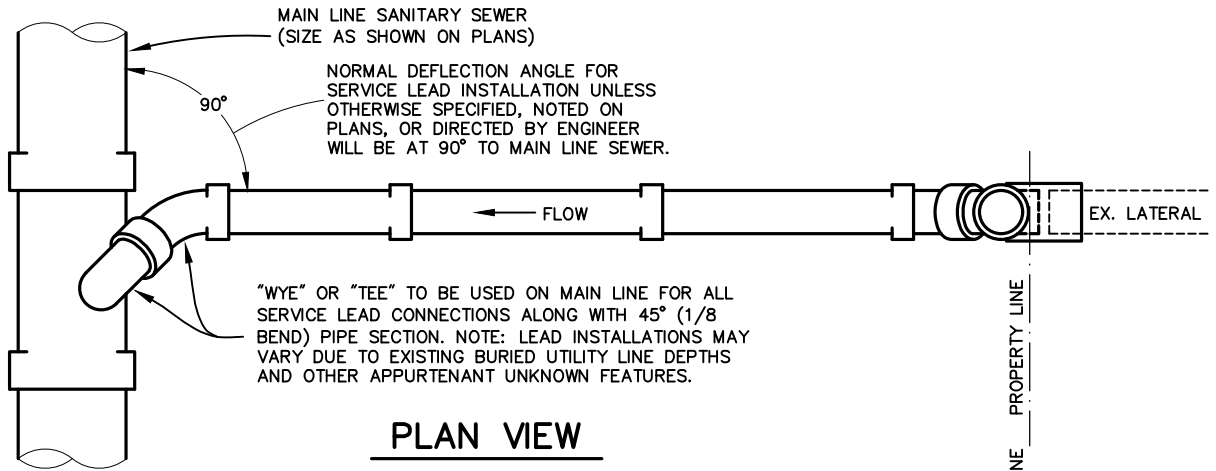
- |   |
|---|
| <ol style="list-style-type: none"> <li>1. ALL BACKFILL INDICATED MUST BE COMPACTED TO 95% OF MAXIMUM DENSITY IN ACCORDANCE WITH M.D.O.T. PROCEDURES.</li> <li>2. METHOD I MUST BE USED IN AREAS OF UNCONSOLIDATED SOILS. (e.g. SAND, GRAVEL)</li> <li>3. METHOD II MUST BE USED IN AREAS OF CONSOLIDATED SOILS (e.g. CLAY, HARDPAN, ROCK)</li> <li>4. IF STONE IS USED FOR BEDDING, A NON-WOVEN GEOTEXTILE SEPARATOR (PER MDOT 910) MUST BE PLACED AROUND ALL AREAS WHERE STONE PIPE EMBEDMENT IS USED.</li> <li>5. TRANSITION ZONES BETWEEN STONE AND SAND EMBEDMENT MUST BE SEPARATED BY A NON-WOVEN GEOTEXTILE SEPARATOR.</li> </ol> |
|---|



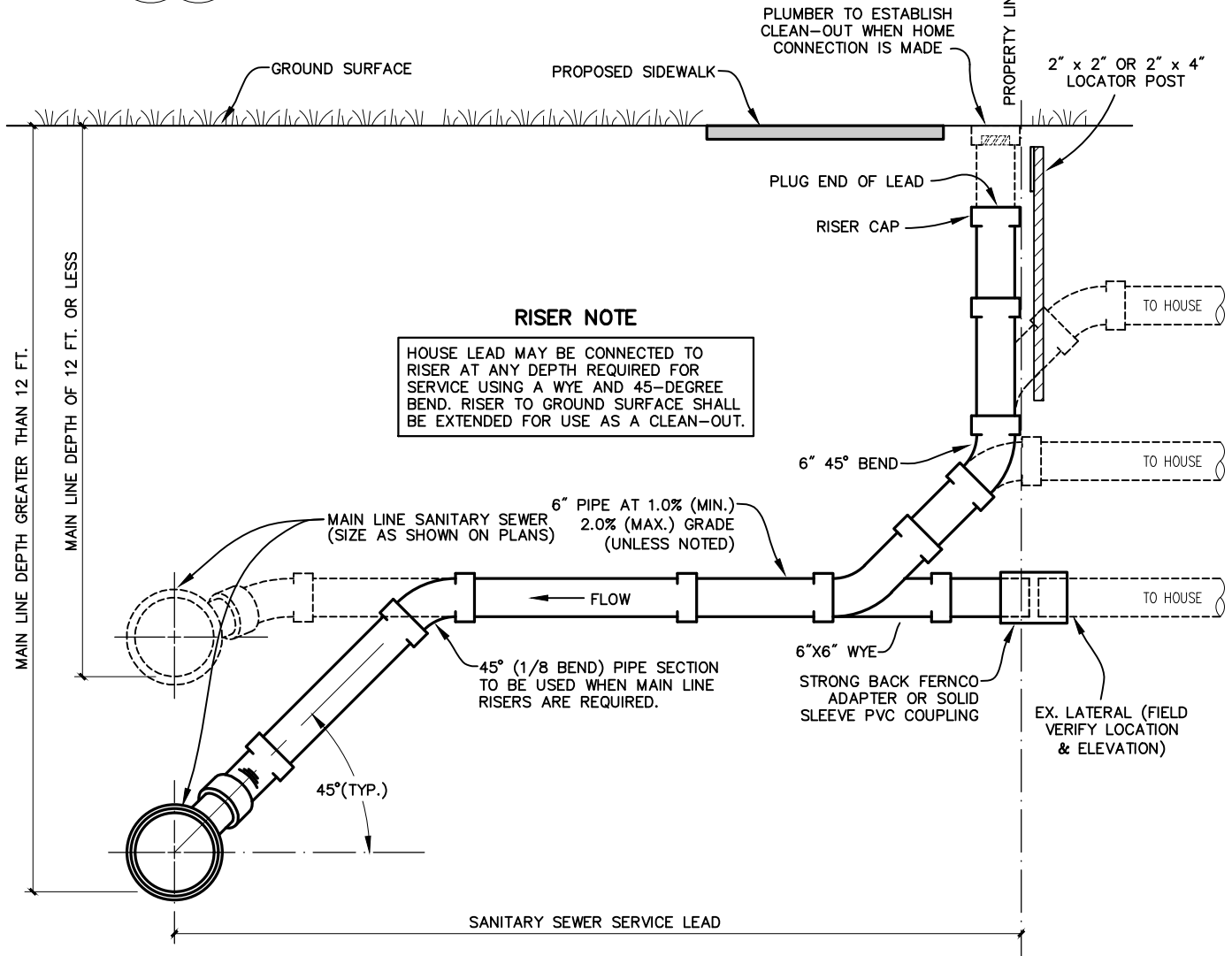
## UNSTABLE SOIL REMOVAL FOR UTILITY

### NOTE

PAYMENT WILL BE PER CUBIC YARD OF MATERIAL, COMPACTED IN PLACE. VOLUME WILL BE BASED ON THE ACTUAL WIDTH AND DEPTH OF MATERIAL REMOVED AND REPLACED, SUBJECT TO ENGINEER REVIEW AND APPROVAL, BUT SHALL NOT EXCEED THE CROSS-SECTION OF THE DETAIL ABOVE.



**PLAN VIEW**



**RISER NOTE**

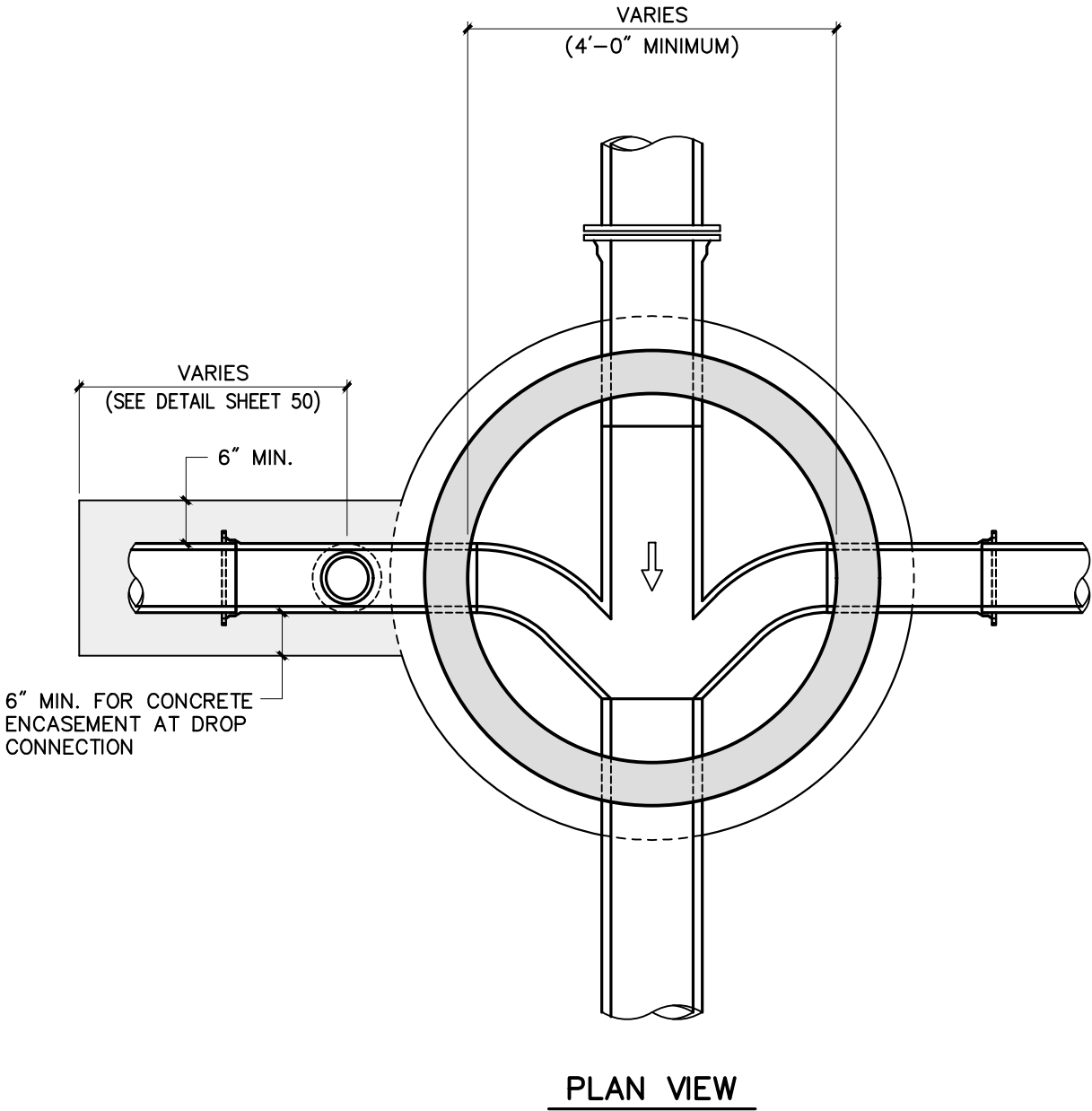
HOUSE LEAD MAY BE CONNECTED TO RISER AT ANY DEPTH REQUIRED FOR SERVICE USING A WYE AND 45-DEGREE BEND. RISER TO GROUND SURFACE SHALL BE EXTENDED FOR USE AS A CLEAN-OUT.

**LATERAL & PROPERTY LINE RISER DETAIL**

**NOTE**

THE NORMAL DEPTH OF A SANITARY SEWER LATERAL SHALL BE 12 FEET BELOW THE EXISTING GRADE AS MEASURED IN FRONT OF THE HOUSE, OR AT THE PROPERTY LINE ON VACANT LOTS. THIS DEPTH MAY BE INCREASED FOR ADVERSE TOPOGRAPHY OR LARGE BUILDING SET BACKS, AS DETERMINED BY THE ENGINEER. IF THE DEPTH OF THE MAIN IS SUCH THAT THE ABOVE LATERAL DEPTH CAN NOT BE ACHIEVED, THE LATERAL SHALL BE PLACED AT A 1% GRADE FROM THE MAIN LINE TO THE PROPERTY LINE.

T:\DWG\3D PROJECTS\2024\240987\_CITY OF KALAMAZOO STD SPECS\4\_PROD\SECTION 6 - SANITARY SEWER\48\_S5\_SANITARY\_LATERAL & PROPERTY LINE RISER.DWG - NSMTH - Nov, 20 2025 - 10:57am - PreshMehrotra



## STANDARD SANITARY SEWER MANHOLE

(PRECAST CONCRETE)

### NOTES

1. IF BOTTOM IS PRECAST CONCRETE, SET ON MINIMUM 4" SAND SUBBASE (CIP) OR CLASS 1A CRUSHED STONE WRAPPED WITH GEOTEXTILE FABRIC.
2. CONE MAY BE ROTATED TO ALIGN STEPS TO VARIOUS LOCATIONS IN MANHOLE.
3. FLOW CHANNEL WALL HEIGHT SHALL BE EQUAL TO CROWN OF PIPE.

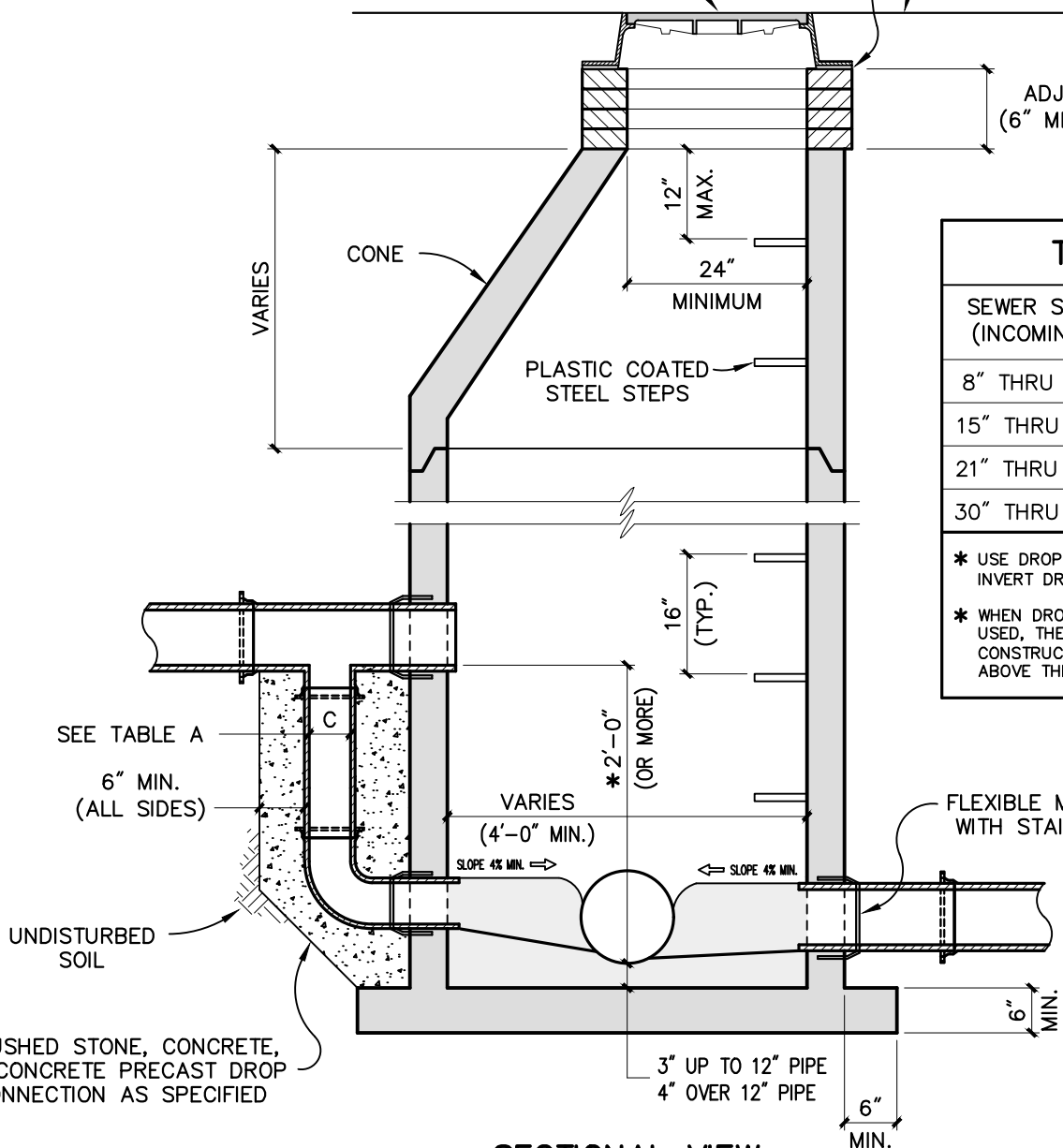
FRAME EJ 1045ZPT,  
COVER EJ 1040 (NON-BOLTED) OR  
EJ 1040APT (BOLTED) AS SPECIFIED

SET FRAME IN  
SOFT MORTAR BED  
FINISH GRADE

ADJUSTING RINGS  
(6" MIN. - 12" MAX.)

SEWER SIZE (INCOMING)	DROP SIZE (C)
8" THRU 12"	8"
15" THRU 18"	10"
21" THRU 27"	12"
30" THRU 36"	15"

\* USE DROP CONNECTION DETAIL FOR INVERT DROPS OVER 2'-0".  
\* WHEN DROP CONNECTIONS ARE NOT USED, THE SEWER SHALL BE CONSTRUCTED NO HIGHER THAN 6" ABOVE THE EFFLUENT INVERT.



SEE TABLE A  
6" MIN.  
(ALL SIDES)

CRUSHED STONE, CONCRETE,  
OR CONCRETE PRECAST DROP  
CONNECTION AS SPECIFIED

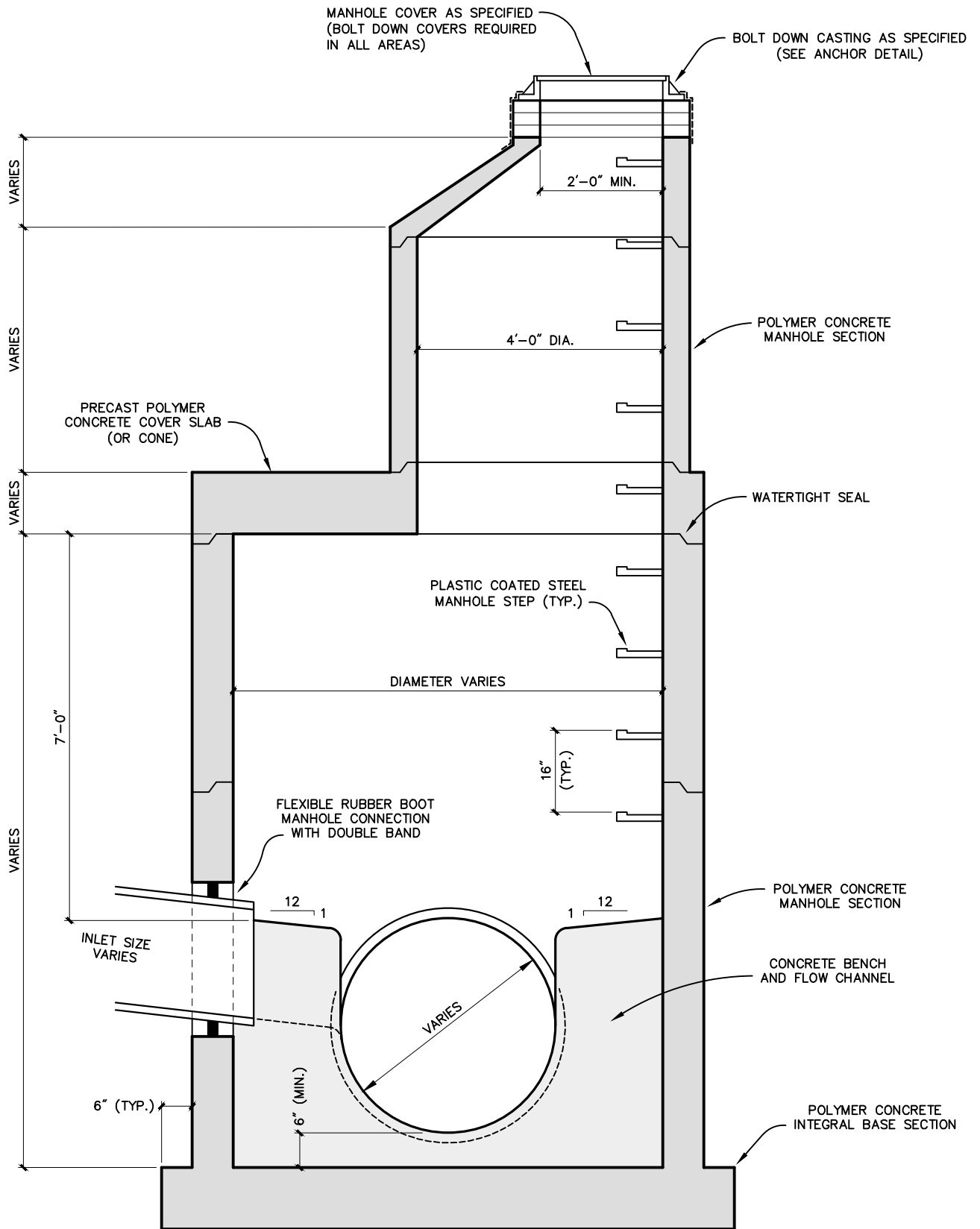
**SECTIONAL VIEW**

**STANDARD SANITARY SEWER MANHOLE  
(PRECAST CONCRETE)**

**NOTES**

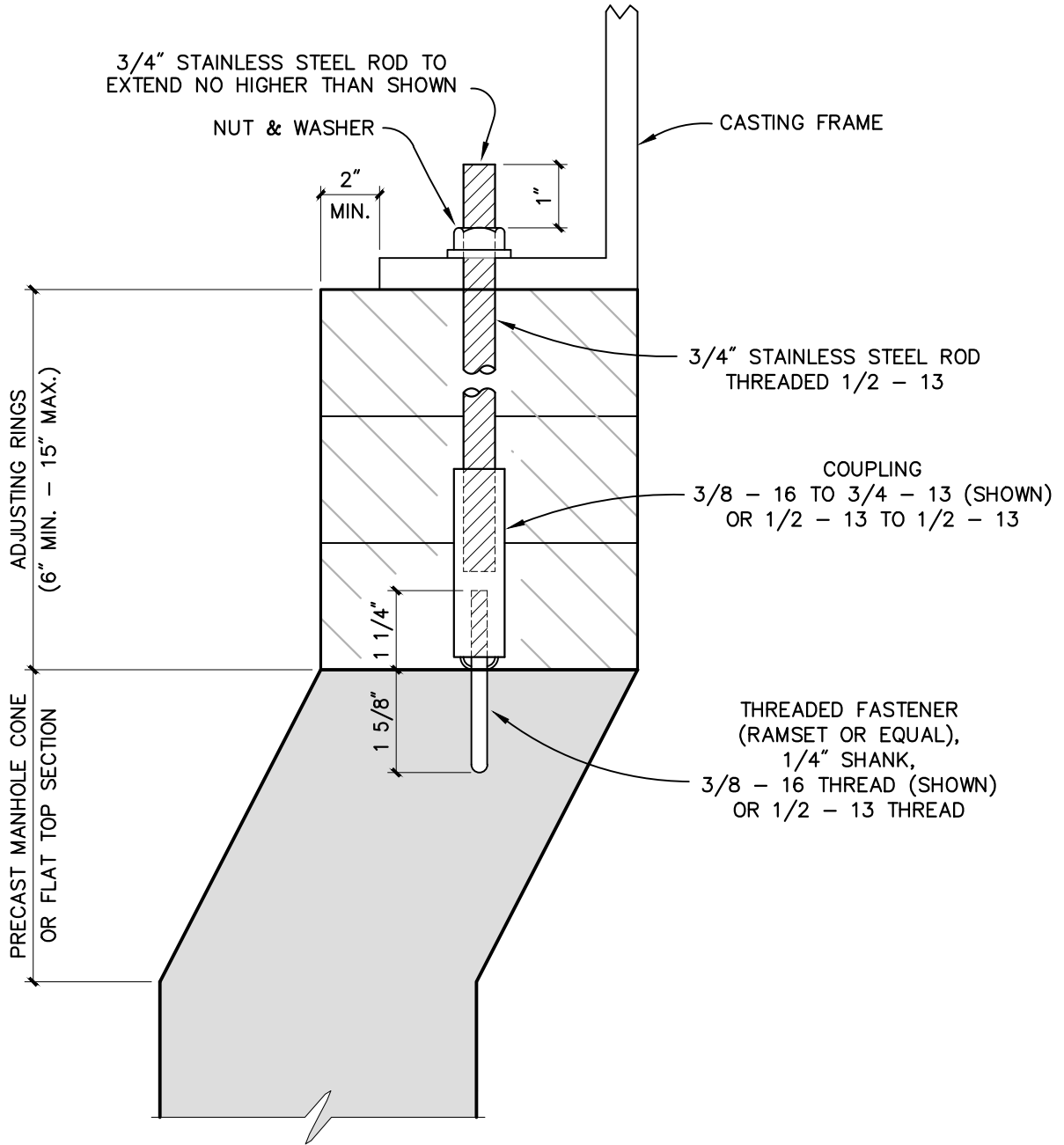
1. PRECAST CONCRETE MANHOLE SHALL MEET ASTM C478.
2. IF BOTTOM IS PRECAST CONCRETE, SET ON MINIMUM 4" SAND SUBBASE (CIP) OR CLASS 1A CRUSHED STONE WRAPPED IN GEOTEXTILE FABRIC.
3. CONE MAY BE ROTATED TO ALIGN STEPS TO VARIOUS LOCATIONS IN MANHOLE.
4. FLOW CHANNEL WALL HEIGHT SHALL BE EQUAL TO CROWN OF PIPE.
5. ALL CASTINGS LOCATED IN CROSS COUNTRY AREAS ARE TO BE INSTALLED WITH BOLT DOWN COVERS AND ANCHORED TO THE MANHOLE STRUCTURE.

T:\DWG\3D PROJECTS\2024\240987\_CITY OF KALAMAZOO STD SPECS\4\_PROD\SECTION 6 - SANITARY SEWER\49-50\_55\_SANITARY MANHOLE PRECAST PLANDING - WSWITH - Nov, 20 2025 - 10:21am - PrintRev01.dwg



## MANHOLE DETAIL (16'-1" & GREATER)

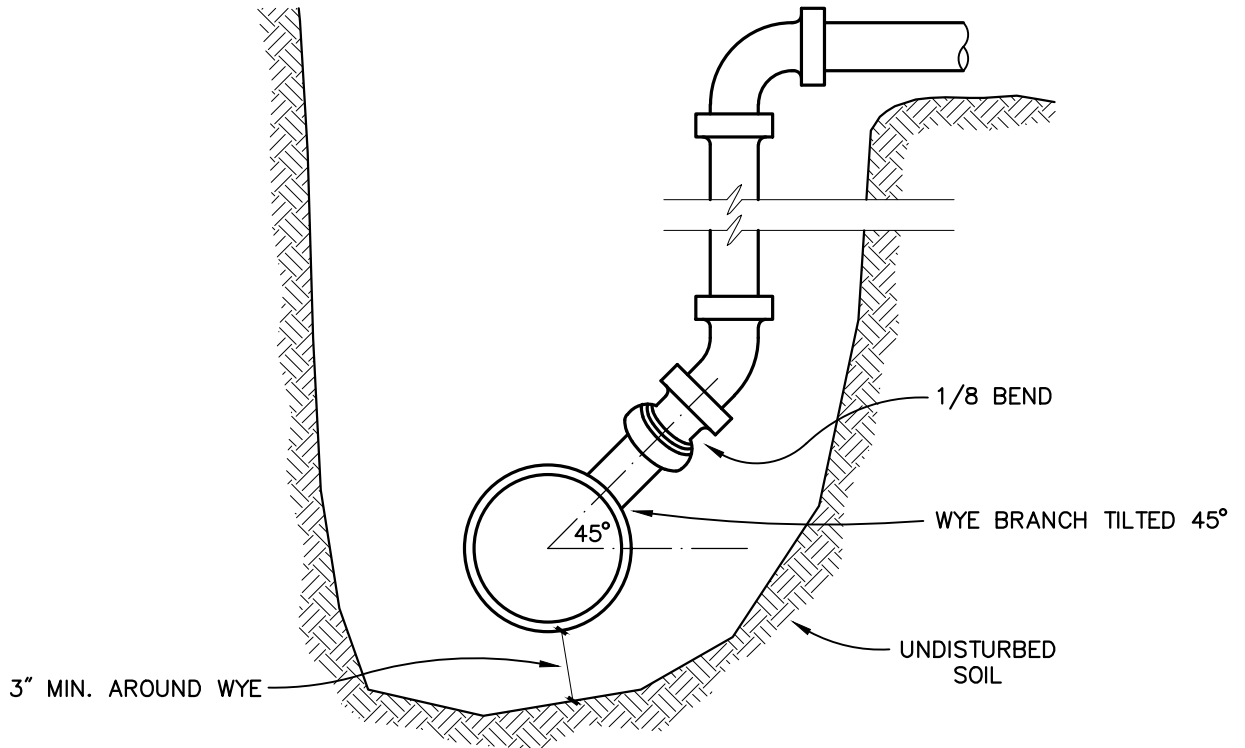
SCALE : NONE



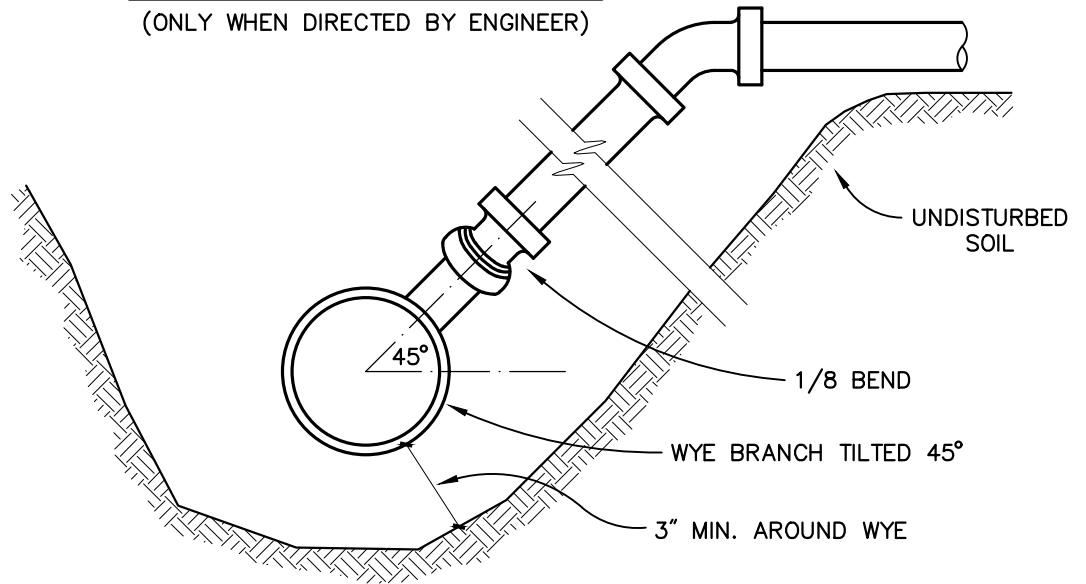
## ANCHOR DETAIL

### NOTE

FOR ALL PRESSURE TIGHT OR WATERTIGHT COVERS IN UNIMPROVED AREAS, FOUR (4) ANCHORS PER COVER



**VERTICAL TRENCH**  
(ONLY WHEN DIRECTED BY ENGINEER)



**SLOPING TRENCH**  
(STANDARD)

## STANDARD RISER DETAILS

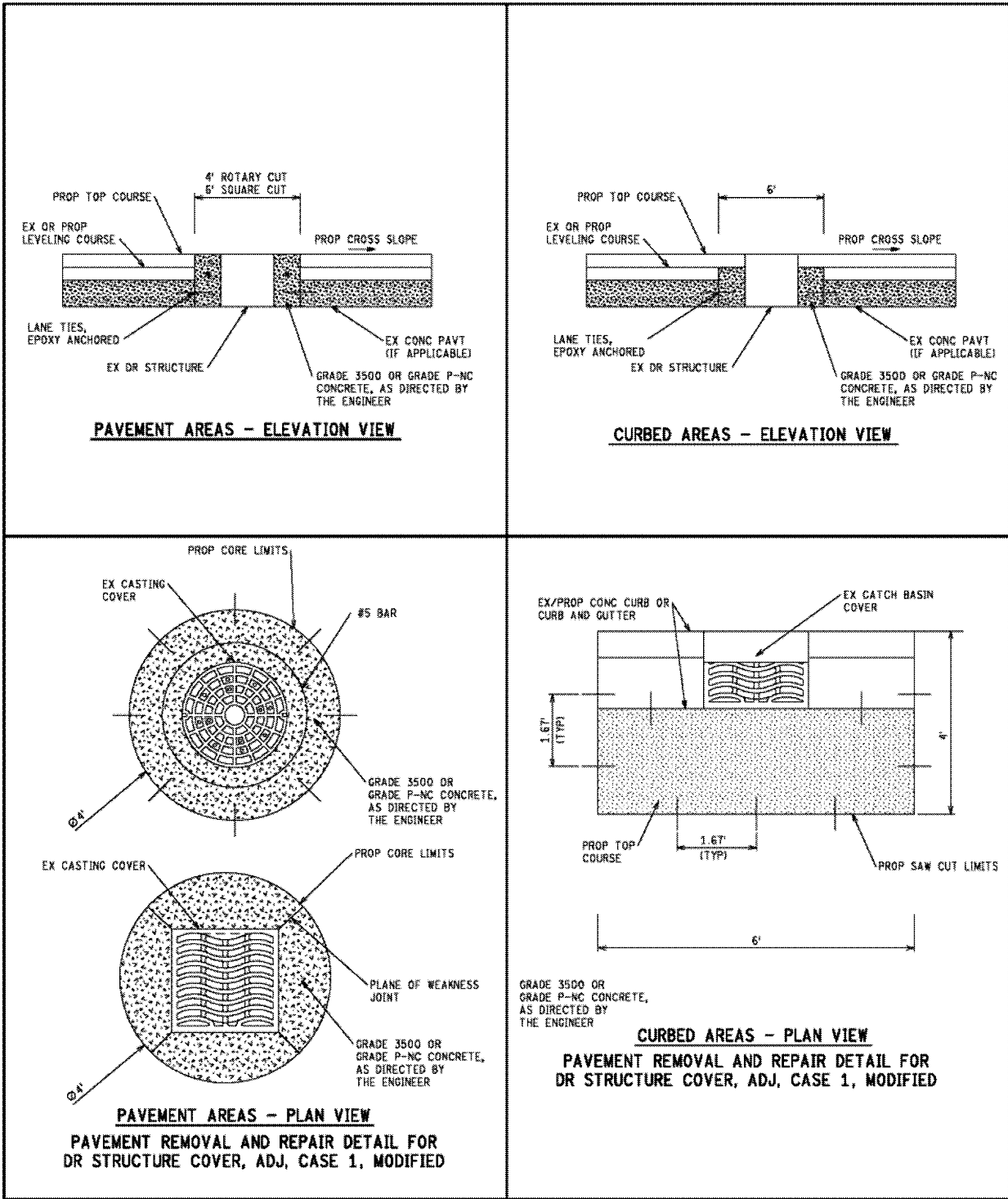
### NOTE

SEE PLANS OR SPECS FOR SIZE AND DEPTH OF LATERAL

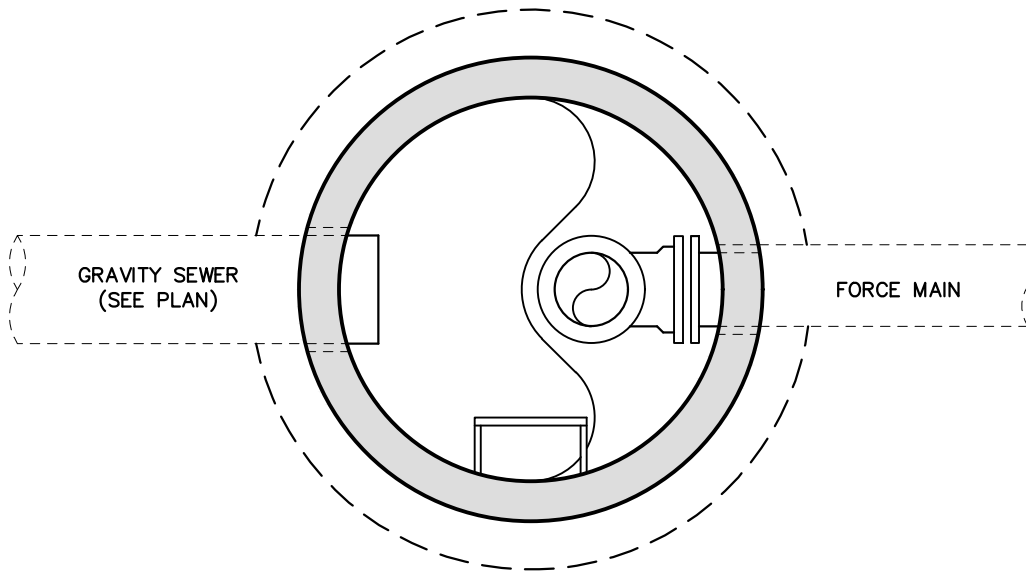
PROJ. NAME: \_\_\_\_\_ SHEET #: \_\_\_\_\_  
 DATE: \_\_\_\_\_ INSP. INTIALS: \_\_\_\_\_  
 TWP: \_\_\_\_\_ CONTRACTOR: \_\_\_\_\_  
 STREET NAME: \_\_\_\_\_  
 LOT # \_\_\_\_\_ HOUSE #: \_\_\_\_\_  
 M.H. # \_\_\_\_\_ M.H. STA.: \_\_\_\_\_  
 DISTANCE FROM DOWNSTREAM M.H.: \_\_\_\_\_  
 IDENT. AS TYPE 1, 2, OR 3: \_\_\_\_\_  
 DIST. FROM MAIN LINE TO END LAT: \_\_\_\_\_  
 ELV. INV. LAT. @ MAIN: \_\_\_\_\_ DIA. \_\_\_\_\_  
 ELV. INV. @ TERM. OF LAT.: \_\_\_\_\_  
 TOP OF RISER ELEV.: \_\_\_\_\_  
 GROUND ELEV. @ RISER: \_\_\_\_\_  
 HSE. FINISHED FLOOR ELEV.: \_\_\_\_\_  
 MARKER POST \_\_\_\_\_  
 REMARKS: \_\_\_\_\_

SKETCH

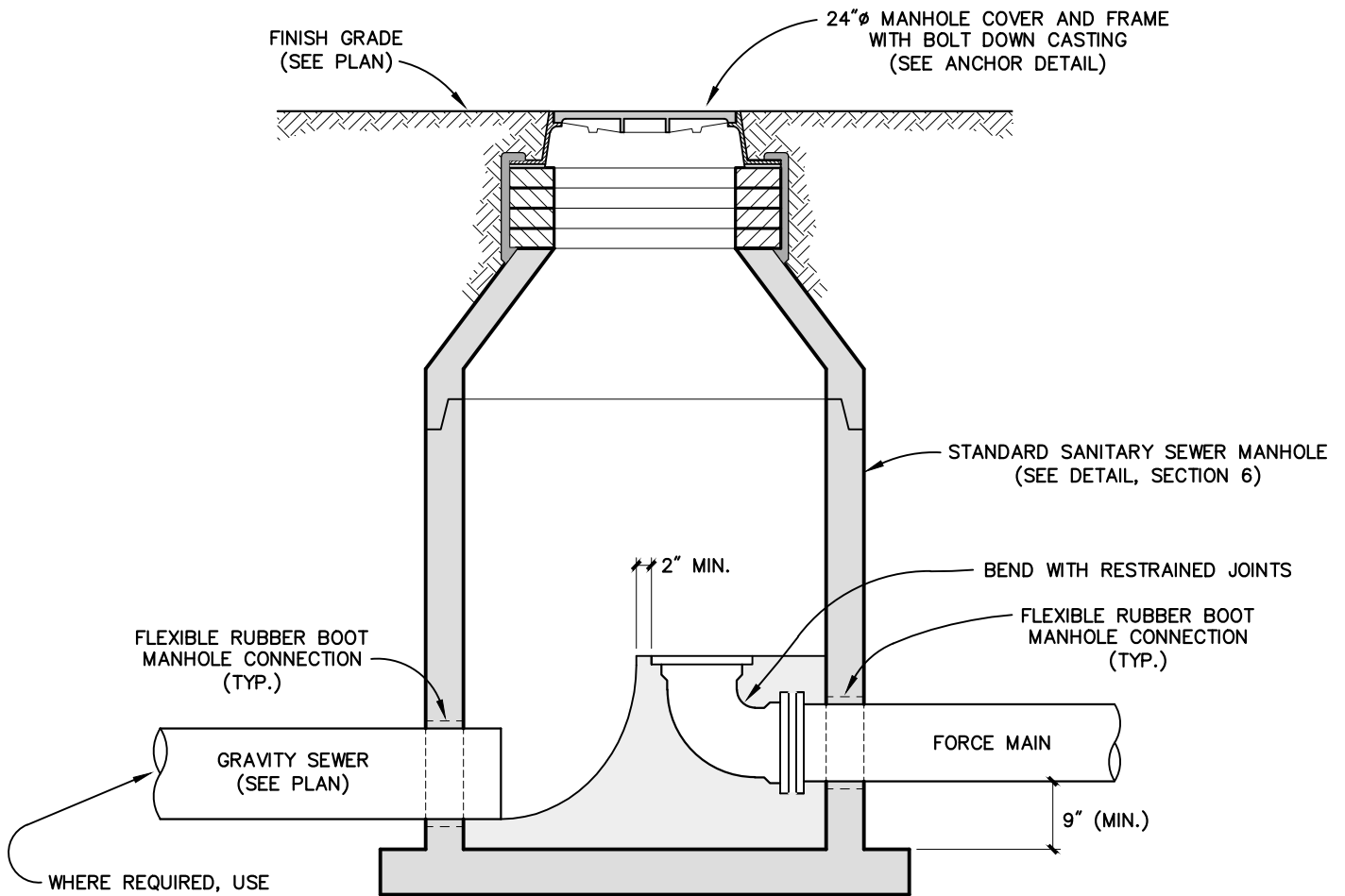
LEAD CARD



# PAVEMENT REMOVAL & REPAIR DETAIL



**PLAN VIEW**

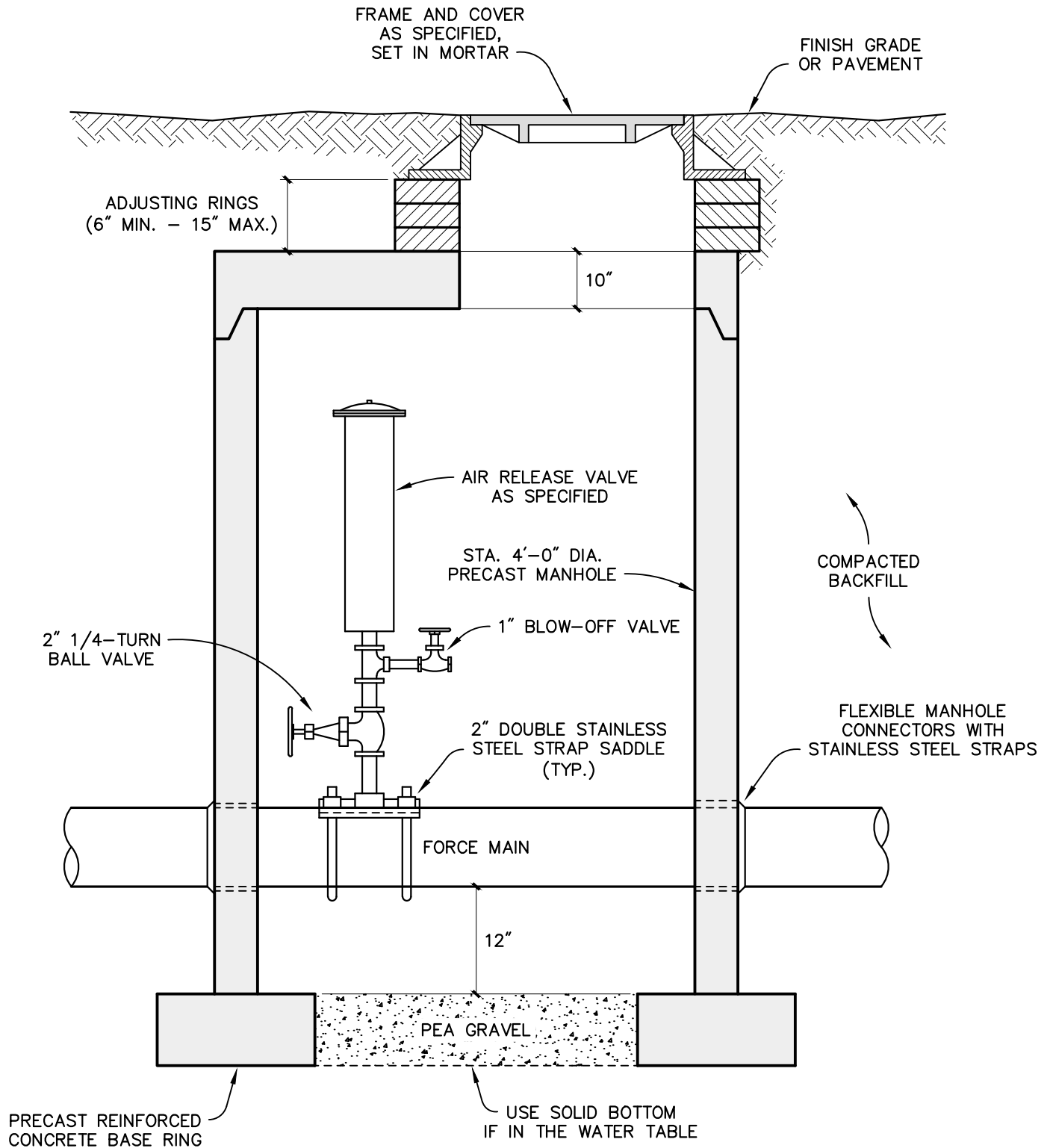


**SECTIONAL VIEW**

**STANDARD FORCE MAIN DISCHARGE MANHOLE**

T:\DWG\3D PROJECTS\2024\240987\_CITY OF KALAMAZOO STD SPECS\4\_PROD\SECTION 7 - FORCE MAIN\56\_ST\_FORCE MAIN\_DROP CONNECTION.DWG - MSW/TH - Nov, 26, 2025 - 08:53am - Print&WebPlot





## STANDARD AIR RELEASE VALVE – MANHOLE

### NOTE

1. PRECAST CONCRETE MANHOLE MUST MEET ASTM C478.
2. INSTALL AIR RELEASE VALVE AT THE VERY HIGHEST ELEVATION OF THE FORCE MAIN.



*Master Streets Details*

**Virginia Ave Sanitary Lateral Install**

**Bid Reference #: 91345-005.0**

**May 2026**



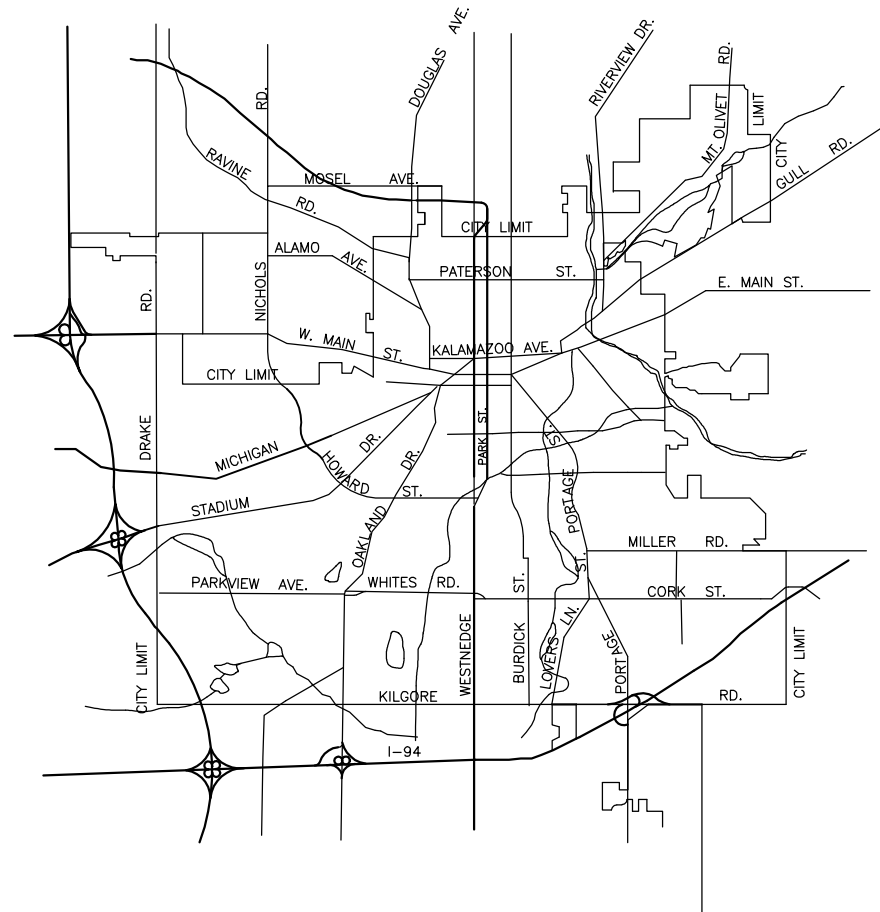
CITY OF KALAMAZOO  
DEPARTMENT OF PUBLIC SERVICES  
ENGINEERING

# CITY OF KALAMAZOO STANDARD STREETS DETAILS

*City of Kalamazoo*

### INDEX OF SHEETS

- 1 STANDARD DETAILS FOR SIDEWALK AND STREETS
- 2 TYPICAL CUTS FOR UTILITIES AND STREETS
- 3-4 FULL/PARTIAL WIDTH MILL AND FILL GUIDELINES
- 5 ADJUSTING DRAINAGE STRUCTURE – MDOT\_20SP-430A-02  
18" CORE / HYDROVAC FOR EXPOSING UTILITY  
BRICK STREET STANDARD DETAIL  
LOCAL STREETS – WINTER CUT DETAIL  
TYPICAL 24" STORM INLET
- 6 KALAMAZOO DOUBLE STORM INLET, MODIFIED
- 7 KALAMAZOO DOUBLE STORM INLET, INFILTRATION
- 8-9 SEEDING & PLANTING



ROW PERMIT  
EXTERNAL  
CONTRACTORS



ROW PERMIT  
COK INTERNAL

No ROW permit shall be issued for the total closure of any major arterial roadway or intersection without prior site plan approval, communications plan, maintenance of traffic plan and temporary traffic control plan all approved by the Public Services Director and City Engineer.

All ROW permit applications for work within major arterial roadways and intersections shall include a maintenance of traffic plan and temporary traffic control plan that will maintain all directions of traffic during all phases of work. Directional and/or total closures shall not be authorized nor will they be permitted.

All maintenance of traffic and temporary traffic control plans shall be in accordance with Part 6 of the 2011 Michigan MUTCD and the 2009 Federal MUTCD.



Know what's below.  
Call before you dig.  
www.missdig.net



MDOT STANDARD BRIDGE PLANS



MDOT STANDARD ROAD PLANS

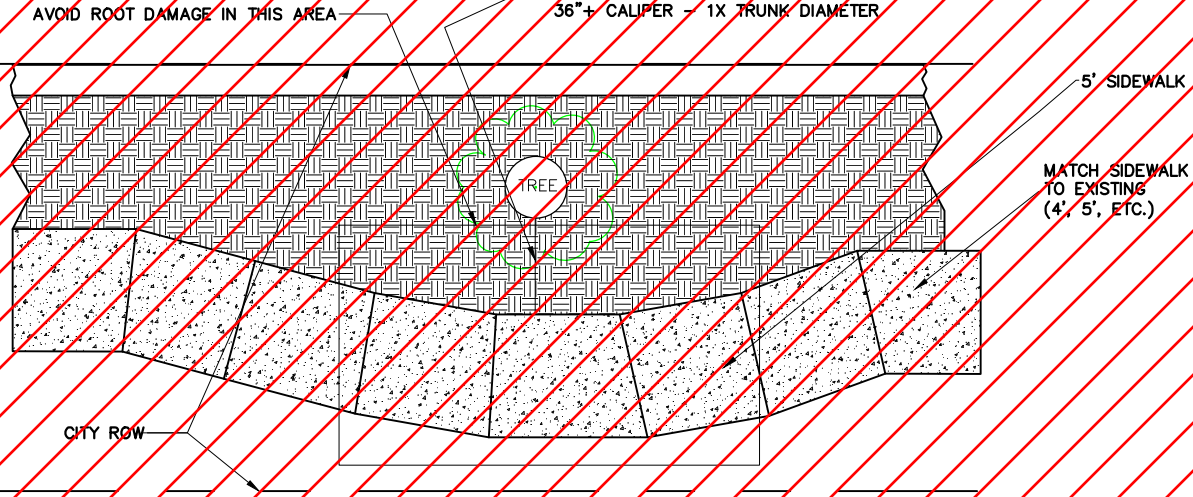
### APPROVAL

<b>CITY OF KALAMAZOO, MICHIGAN</b>	
<b>WILLIAM (JJ) ANTISDALE (STUDENT)</b> THE MONTESSORI SCHOOL	<b>05/23/2025</b> DATE
<b>JAMES J. BAKER, PE</b> PUBLIC SERVICES DIRECTOR & CITY ENGINEER	<b>05/23/2025</b> DATE

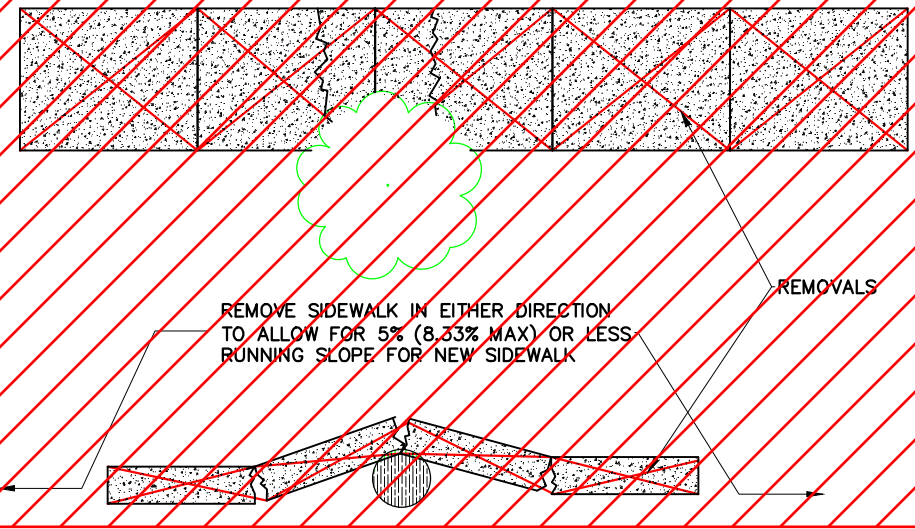
- GENERAL NOTES:
- MDOT STANDARD PLANS R-28-K, R-29-J, R-30-G, AND R-44-F SHALL BE FOLLOWED IN CONJUNCTION WITH THESE STANDARD PLANS
  - ALL SAW CUTTING SHALL BE DONE PERPENDICULAR AND PARALLEL TO THE DIRECTION OF TRAVEL
  - SAW CUTTING SHALL PROVIDE A STRAIGHT, CLEAN, EDGE TO ENHANCE BONDING
  - ALL CUTS SHALL BE RECTANGULAR AND NEATLY CUT TO AVOID SPALLING OF PAVEMENT
  - IN GENERAL ALL ROAD/UTILITY CUTS OF AN AREA GREATER THAN 9SFT (3FTX3FT TYPICAL) SHALL EXTEND THE FULL WIDTH OF THE TRAVEL LANE FOR PAVEMENT WITH LOAD TRANSFER DOWEL RODS OR REINFORCEMENT: NEW LOAD TRANSFER DOWELS/REINFORCEMENT SHALL BE PLACED TO MAINTAIN BEARING CAPACITY OF ROADWAY
  - CUTS LESS THAN 12" SHALL BE PATCHED WITH PCC. IF GREATER THAN 12", ENSURE CUT IS IN ACCORDANCE WITH STANDARD DETAILS AND MATCHING EXISTING ROADWAY
  - BUMPS/CUTS/MILLED AREAS WITH EDGE GREATER THAN 2" DEEP/HIGH MUST BE WEDGED WITH HMA BEFORE OPEN TO TRAFFIC. SEE STANDARD DETAIL.
  - MEANDERING SIDEWALK SHALL ONLY BE PLACED IN THE CITY'S ROW OR WHERE AN EASEMENT IS ESTABLISHED
  - NEW SIDEWALK CONSTRUCTION SHALL MEET OR EXCEED CURRENT ADA AND ACCESSIBILITY STANDARDS
  - REPLACED SIDEWALK SHALL, TO THE EXTENT PRACTICABLE, MEET OR EXCEED ADA AND ACCESSIBILITY STANDARDS
  - SIDEWALK, DRIVEWAY OPENINGS & APPROACHES SHALL CONFORM TO MDOT STANDARD PLAN DETAILS R-28-K AND R-29-J
  - MARSHALL MIX 36/13A (TOP/LEVELING) MAY BE SUBSTITUTED FOR HMA MIX DESIGNS WITH CITY OF KALAMAZOO APPROVAL IF DEEMED APPROPRIATE BY THE ENGINEER
  - ASPHALT BINDER SHALL BE INCLUDED IN THE PAY ITEM FOR HMA
  - MDOT PCC 3500 MIX DESIGN SHALL BE USED FOR ALL CONCRETE UNLESS OTHERWISE STATED OR DIRECTED BY THE ENGINEER
  - OPENING TO TRAFFIC STRENGTHS (2020 STANDARD SPECIFICATIONS FOR CONSTRUCTION, TABLE 603-1):
    - <72 HOURS, GRADE P-NC, 300 psi
    - 72 HOURS +, GRADE 3500/HP, 550 psi

**STANDARD DETAIL - SIDEWALK  
 ROOT AVOIDANCE - MEANDERING SIDEWALK**

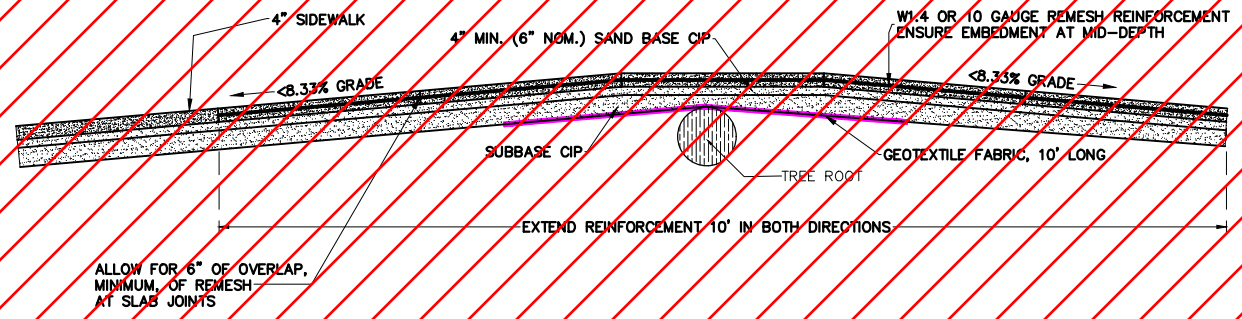
DISTANCE FROM TREE:  
 6"-18" CALIPER - 3X TRUNK DIAMETER  
 19"-36" CALIPER - 2X TRUNK DIAMETER  
 36"+ CALIPER - 1X TRUNK DIAMETER



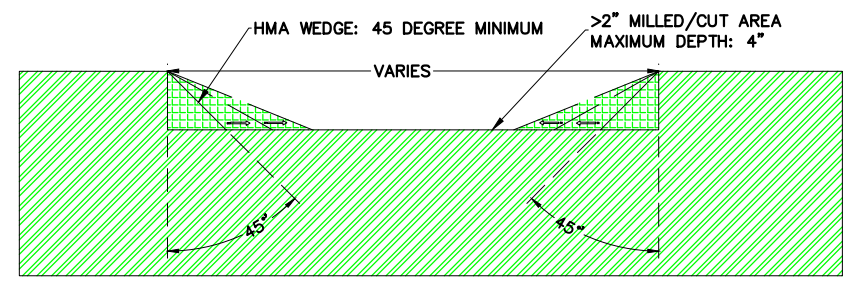
**ROOT CRACKING OF SIDEWALK**



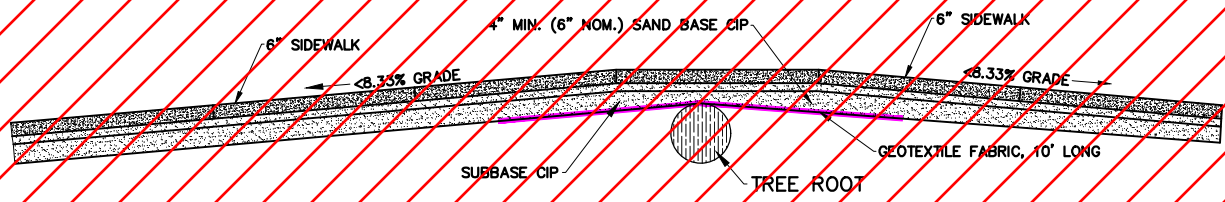
**STANDARD DETAIL -  
 SIDEWALK ROOT AVOIDANCE**



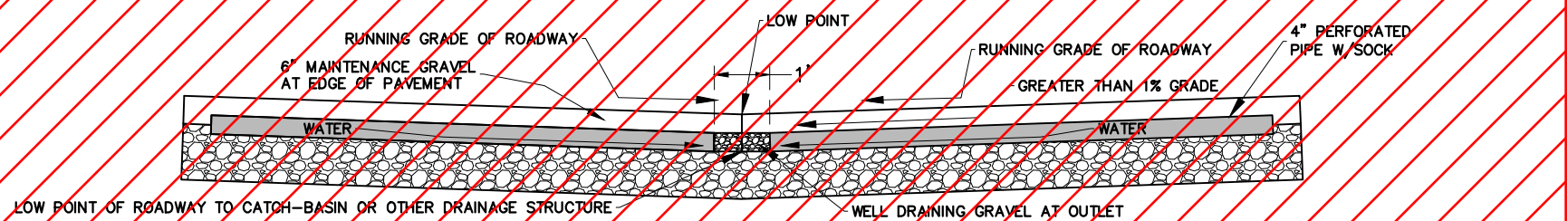
**STANDARD DETAIL - WEDGING  
 CUT / MILLED SECTION**



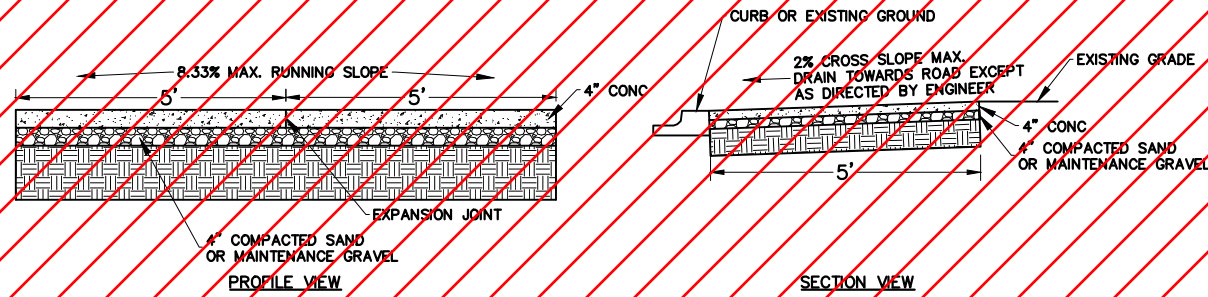
**STANDARD DETAIL - SIDEWALK ROOT AVOIDANCE  
 WITHOUT REINFORCEMENT  
 (USE ONLY AS DIRECTED BY ENGINEER)**



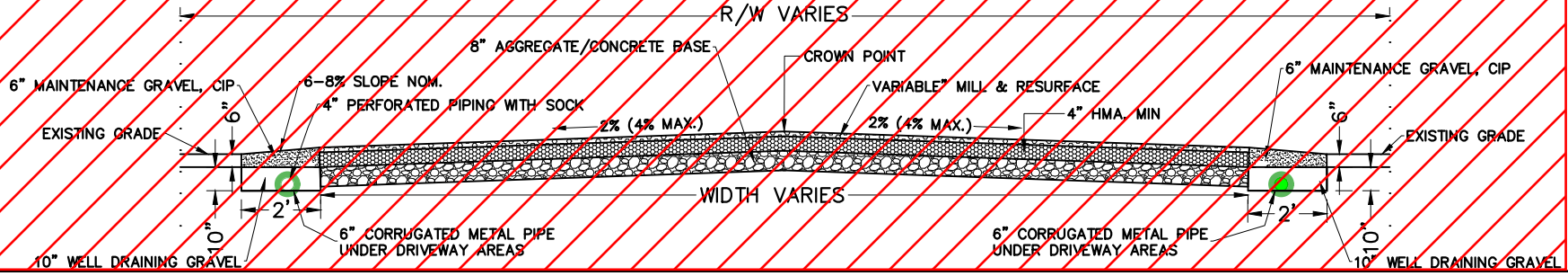
**STANDARD DETAIL - LOW VOLUME / RESIDENTIAL ROADS PERFORATED PIPE DETAIL**



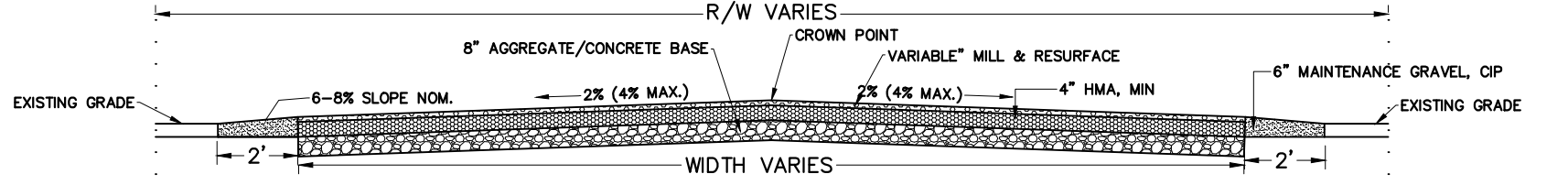
**TYPICAL 4" SIDEWALK DETAIL**



**STANDARD DETAIL - LOW VOLUME / RESIDENTIAL ROADS - POORLY DRAINED AREAS**



**STANDARD DETAIL - LOW VOLUME / RESIDENTIAL ROADS - EASILY DRAINED AREAS**

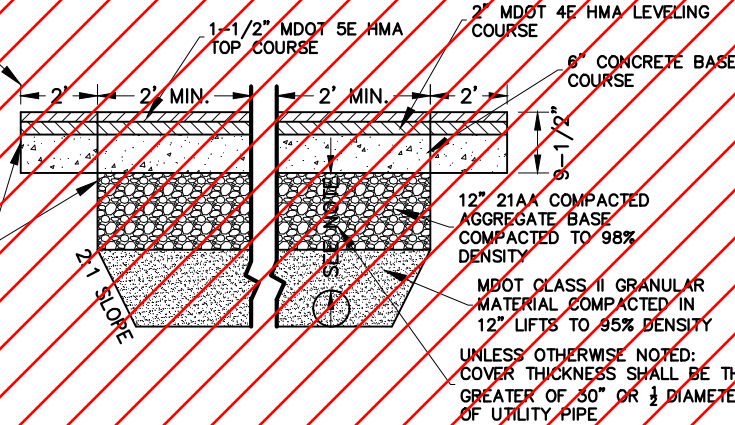


DESIGNED	GHW / JJB	SCALE	
DRAWN	GHW / WEE	VERTICAL	NOT TO SCALE
QA/QC	JJB	HORIZONTAL	NOT TO SCALE
		DATE	01/01/2025

### ASPHALT WITH CONCRETE BASE TRENCH DETAIL

APPLIES TO:  
 CITY MAJOR ROADS  
 COMMERCIAL ROADS  
 HIGH VOLUME ROADS

REMOVE AND REPLACE ASPHALT/CONCRETE MINIMUM 2' PAST CUT LOCATION



SAW CUT OR NEATLY TRIM EDGE WITH AIR HAMMER

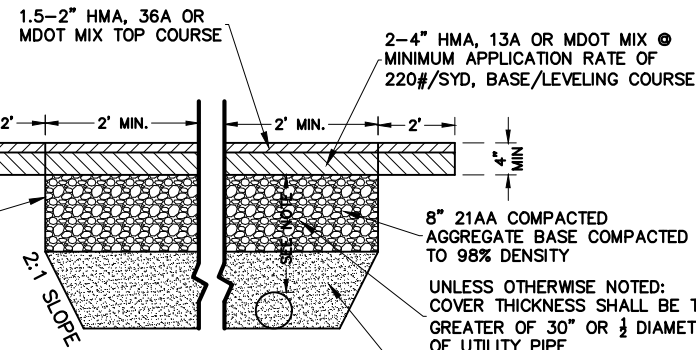
**NOTE:**

- CUT SHALL BE PARALLEL OR PERPENDICULAR TO EDGE OF ROADWAY/GUTTER
- FOR POTHoles 12" DIAMETER AND SMALLER - ALL CONCRETE
- FOR RESTORATION TOO SMALL TO FIT A PLATE COMPACTOR, HAND COMPACT LAYERS AS SHOWN AND FINISH WITH CONCRETE

### RESIDENTIAL / LOW TRAFFIC VOLUME ROAD ASPHALT UTILITY TRENCH DETAIL

APPLIES TO:  
 RESIDENTIAL ROADS  
 CITY LOCAL ROADS  
 LOW-VOLUME ROADS

REMOVE AND REPLACE ASPHALT MINIMUM 2' PAST CUT LOCATION



SAW CUT OR NEATLY TRIM EDGE WITH AIR HAMMER

**NOTE:**

- CUT SHALL BE PARALLEL OR PERPENDICULAR TO EDGE OF ROADWAY/GUTTER
- \*SS-1H @ 0.10/GAL/SYD BETWEEN LIFTS
- PERFORMANCE GRADE BINDER TO BE USED: PG 64-28

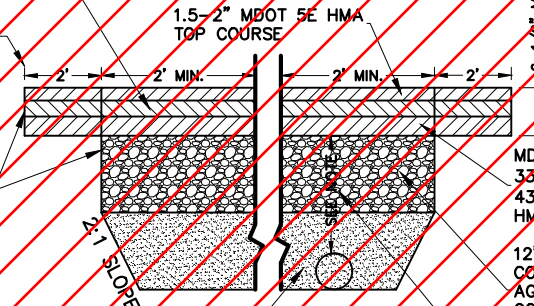
**GENERAL NOTES:**

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- ALL CUTS SHALL BE RECTANGULAR AND NEATLY CUT TO AVOID SPALLING OF PAVEMENT
- IN GENERAL ALL ROAD/UTILITY CUTS OF AN AREA GREATER THAN 9SFT (3FTX3FT TYPICAL) SHALL EXTEND THE FULL WIDTH OF THE TRAVEL LANE FOR PAVEMENT WITH LOAD TRANSFER DOWEL RODS OR REINFORCEMENT: NEW LOAD TRANSFER DOWELS/REINFORCEMENT SHALL BE PLACED TO MAINTAIN BEARING CAPACITY OF ROADWAY
- CUTS LESS THAN 12" SHALL BE PATCHED WITH PCC. IF GREATER THAN 12", ENSURE CUT IS IN ACCORDANCE WITH STANDARD DETAILS AND MATCHING EXISTING ROADWAY
- BUMPS/CUTS/MILLED AREAS WITH EDGE GREATER THAN 2" DEEP/HIGH MUST BE WEDGED WITH HMA BEFORE OPEN TO TRAFFIC. SEE STANDARD DETAIL.
- MEANDERING SIDEWALK SHALL ONLY BE PLACED IN THE CITY'S ROW OR WHERE AN EASEMENT IS ESTABLISHED
- NEW SIDEWALK CONSTRUCTION SHALL MEET OR EXCEED CURRENT ADA AND ACCESSIBILITY STANDARDS
- REPLACED SIDEWALK SHALL, TO THE EXTENT PRACTICABLE, MEET OR EXCEED ADA AND ACCESSIBILITY STANDARDS
- SIDEWALK, DRIVEWAY OPENINGS & APPROACHES SHALL CONFORM TO MDOT STANDARD PLAN DETAILS R-28-K AND R-29-J
- MARSHALL MIX 36/13A (TOP/LEVELING) MAY BE SUBSTITUTED FOR HMA MIX DESIGNS WITH CITY OF KALAMAZOO APPROVAL IF DEEMED APPROPRIATE BY THE ENGINEER
- ASPHALT BINDER SHALL BE INCLUDED IN THE PAY ITEM FOR HMA
- MDOT PCC 3500 MIX DESIGN SHALL BE USED FOR ALL CONCRETE UNLESS OTHERWISE STATED OR DIRECTED BY THE ENGINEER
- OPENING TO TRAFFIC STRENGTHS (2020 STANDARD SPECIFICATIONS FOR CONSTRUCTION, TABLE 603-1):
  - <72 HOURS, GRADE P-NC, 300 psi
  - 72 HOURS +, GRADE 3500/HP, 550 psi

### COMMERCIAL ROAD ASPHALT UTILITY TRENCH DETAIL

APPLIES TO:  
 CITY MAJOR ROADS  
 COMMERCIAL ROADS  
 HIGH VOLUME ROADS

REMOVE AND REPLACE ASPHALT MINIMUM 2' PAST CUT LOCATION



SAW CUT OR NEATLY TRIM EDGE WITH AIR HAMMER

**NOTE:**

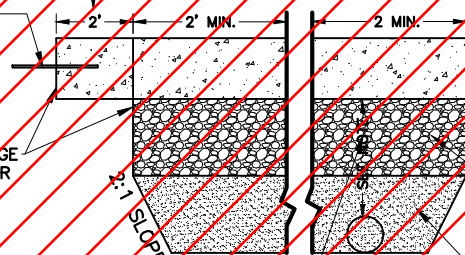
- CUT SHALL BE PARALLEL OR PERPENDICULAR TO EDGE OF ROADWAY/GUTTER
- \*SS-1H @ 0.10/GAL/SYD BETWEEN LIFTS
- PERFORMANCE GRADE BINDER TO BE USED: PG 64-28
- HEAVY COMMERCIAL ADT COULD WARRANT CHANGE TO DESIGN.

### TYPICAL CUT USING PCC TO FILL (WINTER CUT)

APPLIES TO:  
 CITY MAJOR / LOCAL ROADS  
 COMMERCIAL ROADS  
 HIGH / LOW VOLUME ROADS  
 WINTER ROAD CUTS (SURFACE TEMP BELOW 35°F)  
 AND / OR NO PLANT MIX HMA IS AVAILABLE

REMOVE AND REPLACE ASPHALT/CONCRETE MINIMUM 2' PAST CUT LOCATION

REPLACE REINFORCING TIE BARS (IF APPLICABLE)



SAW CUT OR NEATLY TRIM EDGE WITH AIR HAMMER

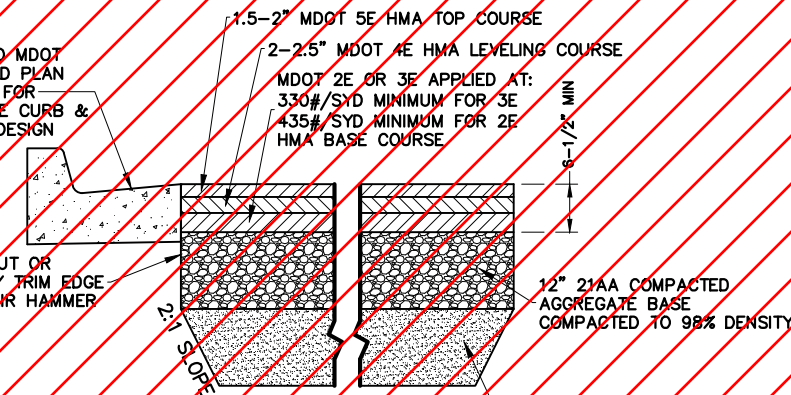
**NOTE:**

- CUT SHALL BE PARALLEL OR PERPENDICULAR TO EDGE OF ROADWAY/GUTTER
- FOR POTHoles 12" DIAMETER AND SMALLER - ALL CONCRETE
- FOR RESTORATION TOO SMALL TO FIT A PLATE COMPACTOR, HAND COMPACT LAYERS AS SHOWN AND FINISH WITH CONCRETE

### COMMERCIAL ROAD ASPHALT PAVEMENT DETAIL

APPLIES TO:  
 CITY MAJOR ROADS  
 COMMERCIAL ROADS  
 HIGH VOLUME ROADS

REFER TO MDOT STANDARD PLAN R-30-G FOR CONCRETE CURB & GUTTER DESIGN



SAW CUT OR NEATLY TRIM EDGE WITH AIR HAMMER

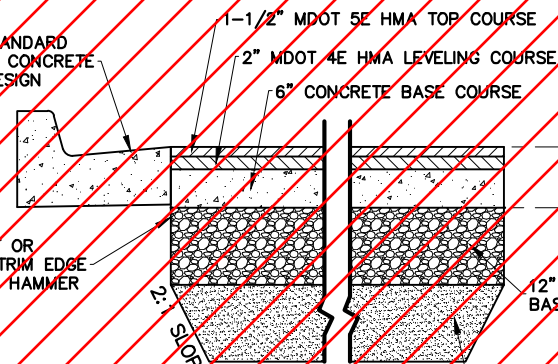
**NOTE:**

- \*SS-1H @ 0.10/GAL/SYD BETWEEN LIFTS
- PERFORMANCE GRADE BINDER TO BE USED: PG 64-28

### ASPHALT PAVEMENT WITH CONCRETE BASE DETAIL

APPLIES TO:  
 CITY MAJOR ROADS  
 COMMERCIAL ROADS  
 HIGH VOLUME ROADS

REFER TO MDOT STANDARD PLAN R-30-G FOR CONCRETE CURB & GUTTER DESIGN



SAW CUT OR NEATLY TRIM EDGE WITH AIR HAMMER

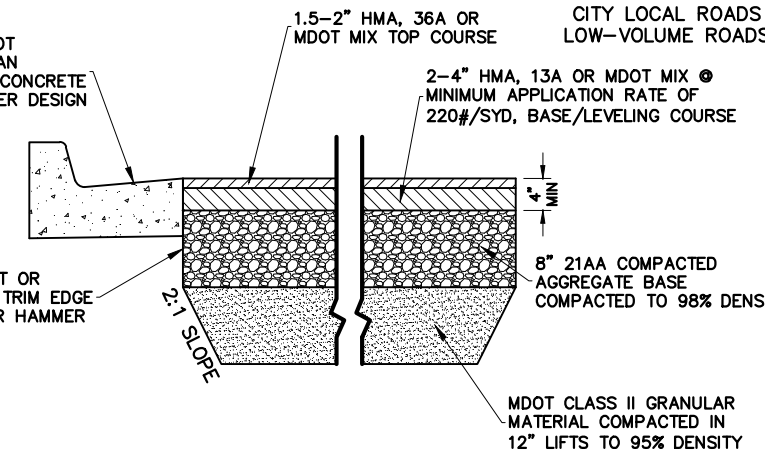
**NOTE:**

- \*SS-1H @ 0.10/GAL/SYD BETWEEN LIFTS
- PERFORMANCE GRADE BINDER TO BE USED: PG 64-28

### RESIDENTIAL / LOW TRAFFIC VOLUME ROAD ASPHALT PAVEMENT DETAIL

APPLIES TO:  
 RESIDENTIAL ROADS  
 CITY LOCAL ROADS  
 LOW-VOLUME ROADS

REFER TO MDOT STANDARD PLAN R-30-G FOR CONCRETE CURB & GUTTER DESIGN




SAW CUT OR NEATLY TRIM EDGE WITH AIR HAMMER

**NOTE:**

- \*SS-1H @ 0.10/GAL/SYD BETWEEN LIFTS
- PERFORMANCE GRADE BINDER TO BE USED: PG 64-28

# PAVEMENT CUT / PATCHING DETAILS


 DEPARTMENT OF PUBLIC SERVICES - Engineering  
**STANDARD DETAILS - SHEET 3**  
 CITY OF KALAMAZOO

DESIGNED	GHW / JJB	SCALE	
DRAWN	GHW / WEE	VERTICAL	NOT TO SCALE
QA/QC	JJB	HORIZONTAL	NOT TO SCALE
		DATE	01/01/2025

## CUT OR PATCH DETAILS

IF PAVEMENT CUT EXTENDS INTO LANE MORE THAN 25% (3FT FOR A TYPICAL LANE WIDTH) THEN...

- MILL & REPAVE FULL LANE WIDTH
- MILLING SHOULD EXTEND THE FILL WIDTH OF THE LANE AND 2FT PAST THE CUT AREA TO A MINIMUM DEPTH OF 1.5" AND REPAVED USING MDOT 5E\_ HMA
- EXAMPLES 1-4

IF PAVEMENT CUT IS GREATER THAN OR EQUAL TO 9SFT IN AREA (3FTX3FT TYPICAL) THEN...

- MILL & REPAVE FULL LANE WIDTH
- MILLING SHOULD EXTEND THE FILL WIDTH OF THE LANE AND 2FT PAST THE CUT AREA TO A MINIMUM DEPTH OF 1.5" AND REPAVED USING MDOT 5E\_ HMA
- EXAMPLES 1, 3, & 4

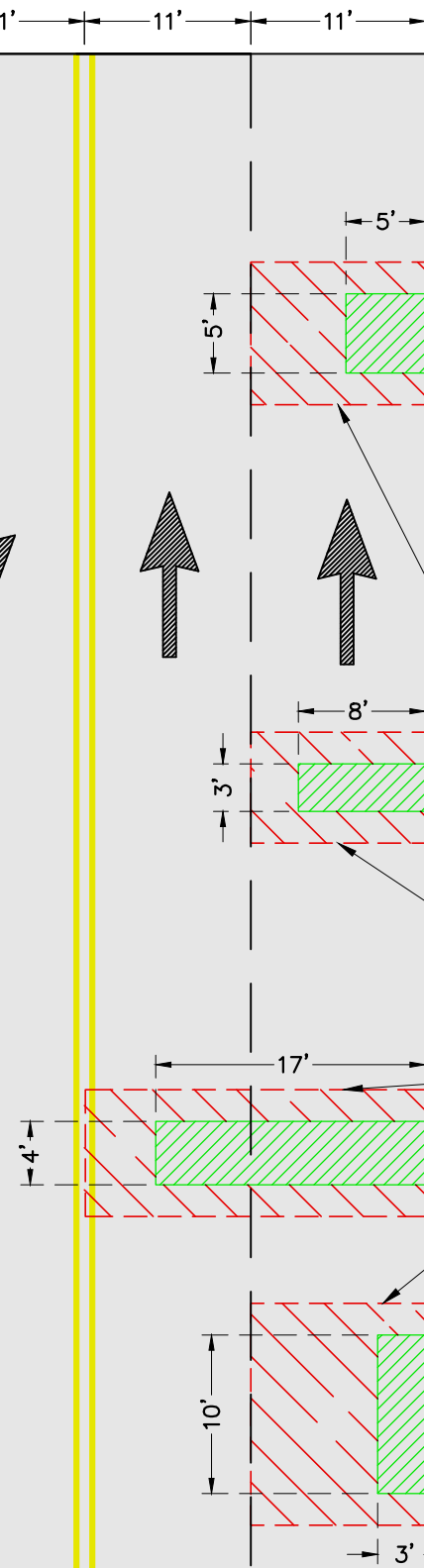
IF PAVEMENT CUT EXTENDS ACROSS MULTIPLE LANES THEN...

- MILL & REPAVE THE FULL WIDTH OF EACH LANE THE CUT COMES INTO - EVEN IF IT ONLY PARTIALLY GOES INTO AN ADJOINING TRAVEL LANE
- MILLING SHOULD EXTEND THE FILL WIDTH OF THE LANE(S) AND 2FT PAST THE CUT AREA TO A MINIMUM DEPTH OF 1.5" AND REPAVED USING MDOT 5E\_ HMA
- EXAMPLE 3

IN AREAS WITH MULTIPLE CUTS, CONTACT THE CITY OF KALAMAZOO RIGHT OF WAY COORDINATOR PRIOR TO RESTORATION. RIGHT OF WAY COORDINATOR WILL DETERMINE THE BEST APPLICATION FOR THE AREA.

EDGES SHOULD BE SAW CUT IN A CLEAN LINE SO THEY ARE PARALLEL OR PERPENDICULAR TO TRAFFIC

1.5" MILL & RESURFACE FULL LANE WIDTH & 2' BEYOND THE OUTSIDE OF THE PATCH AREA



## CUT OR PATCH DETAILS

IF PAVEMENT CUTS EQUAL 5 OR MORE IN A 100 FT LINEAR LENGTH OF PAVEMENT OR THE TOTAL CUT AREAS EQUAL 100SFT OR MORE THEN...

- MILLING SHOULD EXTEND THE FILL WIDTH OF THE LANE AND 2FT PAST THE FURTHEST CUT AREAS TO A MINIMUM DEPTH OF 1.5" AND REPAVED USING MDOT 5E\_ HMA

IF PAVEMENT CUTS EXTEND ACROSS MULTIPLE LANES THEN...

- FOLLOW THE MILLING & RESURFACING GUIDANCE ABOVE ACROSS ALL AFFECTED LANES

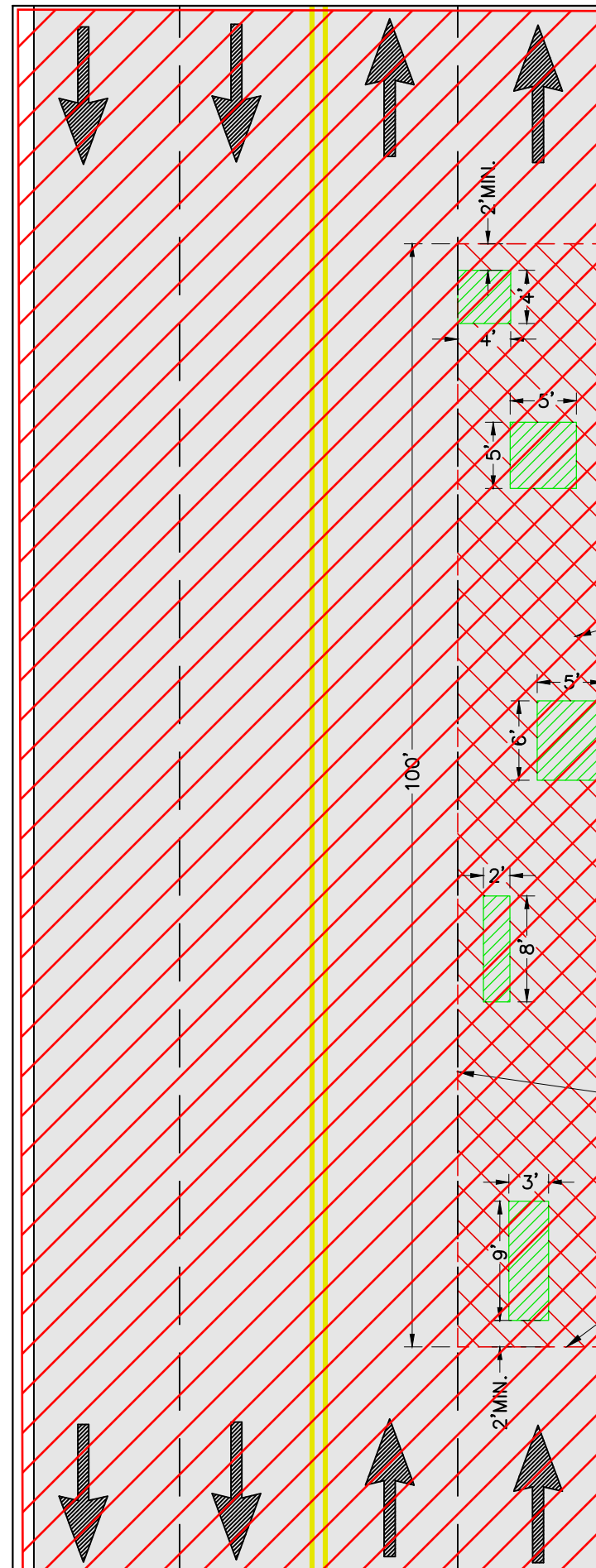
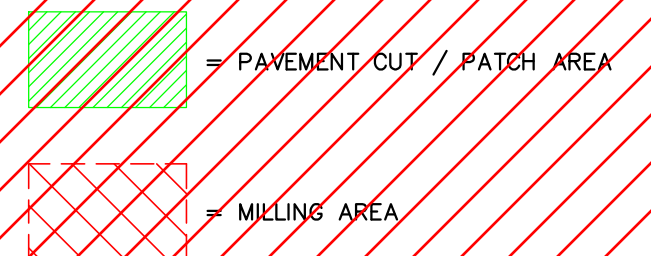
MILL & RESURFACE FULL LANE WIDTH

IN AREAS WITH MULTIPLE CUTS, CONTACT THE CITY OF KALAMAZOO RIGHT OF WAY COORDINATOR PRIOR TO RESTORATION. RIGHT OF WAY COORDINATOR WILL DETERMINE THE BEST APPLICATION FOR THE AREA.

114 SQ FT

EDGES SHOULD BE SAW CUT IN A CLEAN LINE SO THEY ARE PARALLEL OR PERPENDICULAR TO TRAFFIC

1.5" MILL & RESURFACE FULL LANE WIDTH & 2' BEYOND THE OUTSIDE OF THE PATCH AREA



PAVEMENT CUT / PATCHING DETAILS

DESIGNED	GHW / JJB	SCALE	
DRAWN	GHW / WEE	VERTICAL	NOT TO SCALE
QA/QC	JJB	HORIZONTAL	NOT TO SCALE
		DATE	01/01/2025

CUT OR PATCH DETAILS

IF PAVEMENT CUTS EQUAL 4 OR MORE IN A 100 FT LINEAR LENGTH OF PAVEMENT AND THE TOTAL CUT AREAS EQUAL 150SFT OR MORE THEN...  
 MILLING SHOULD EXTEND THE FULL WIDTH OF THE LANE AND 2FT PAST THE FURTHEST CUT AREAS TO A MINIMUM DEPTH OF 1.5" AND REPAVED USING MDOT 5E\_ HMA

IF PAVEMENT CUTS EXTEND ACROSS MULTIPLE LANES THEN...  
 FOLLOW THE MILLING & RESURFACING GUIDANCE ABOVE ACROSS ALL AFFECTED LANES

IN AREAS WITH MULTIPLE CUTS, CONTACT THE CITY OF KALAMAZOO RIGHT OF WAY COORDINATOR PRIOR TO RESTORATION. RIGHT OF WAY COORDINATOR WILL DETERMINE THE BEST APPLICATION FOR THE AREA.

187 SQ FT

MILL & RESURFACE FULL LANE WIDTH

 = PAVEMENT CUT / PATCH AREA

 = MILLING AREA

EDGES SHOULD BE SAW CUT IN A CLEAN LINE SO THEY ARE PARALLEL OR PERPENDICULAR TO TRAFFIC

CUT OR PATCH DETAILS

IF PAVEMENT CUTS EQUAL 2 OR MORE IN A 100 FT LINEAR LENGTH OF PAVEMENT AND THE TOTAL CUT AREAS EQUAL 200SFT OR MORE THEN...  
 MILLING SHOULD EXTEND THE FULL WIDTH OF THE LANE AND 2FT PAST THE FURTHEST CUT AREAS TO A MINIMUM DEPTH OF 1.5" AND REPAVED USING MDOT 5E\_ HMA

IF PAVEMENT CUTS EXTEND ACROSS MULTIPLE LANES THEN...  
 FOLLOW THE MILLING & RESURFACING GUIDANCE ABOVE ACROSS ALL AFFECTED LANES

IN AREAS WITH MULTIPLE CUTS, CONTACT THE CITY OF KALAMAZOO RIGHT OF WAY COORDINATOR PRIOR TO RESTORATION. RIGHT OF WAY COORDINATOR WILL DETERMINE THE BEST APPLICATION FOR THE AREA.

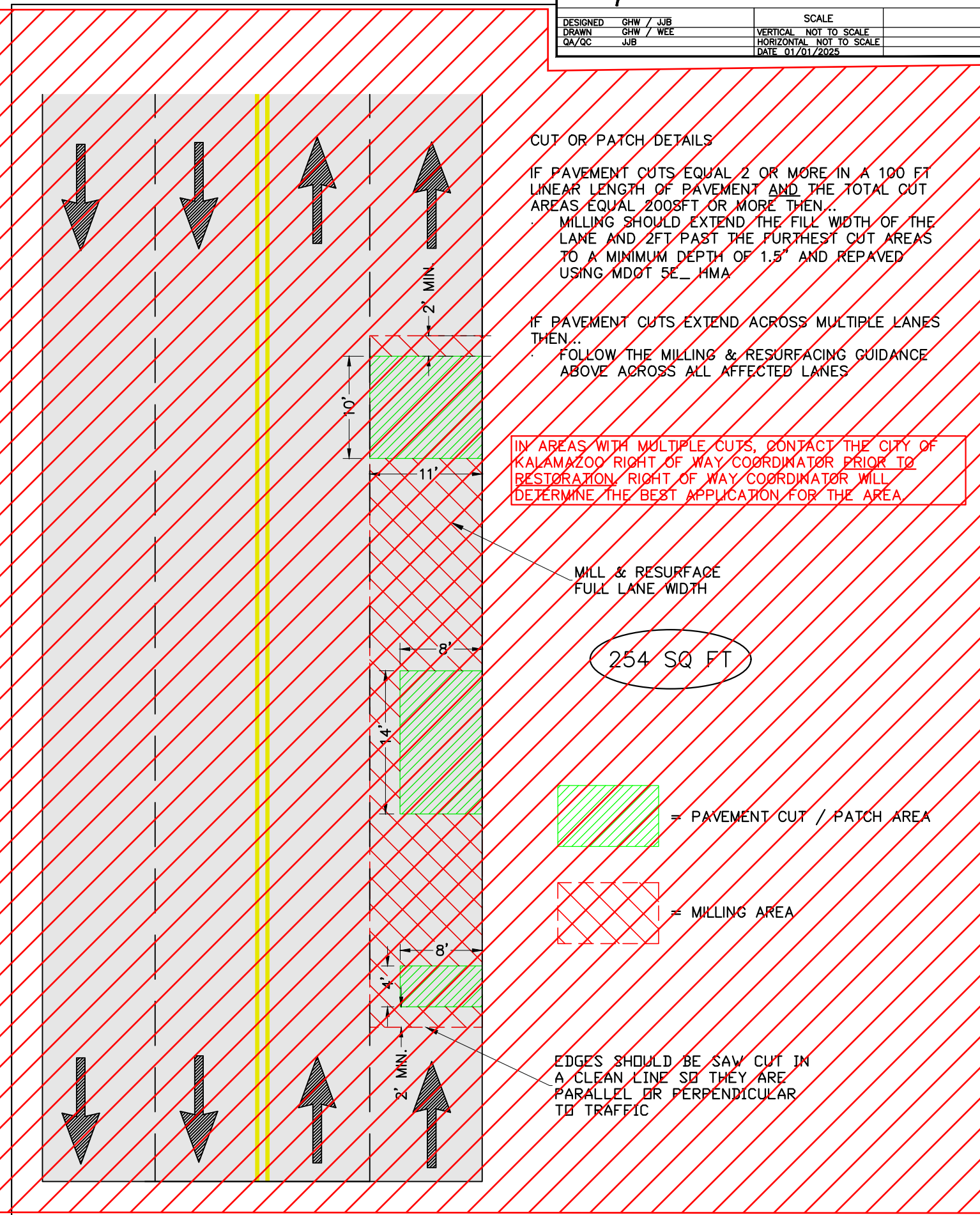
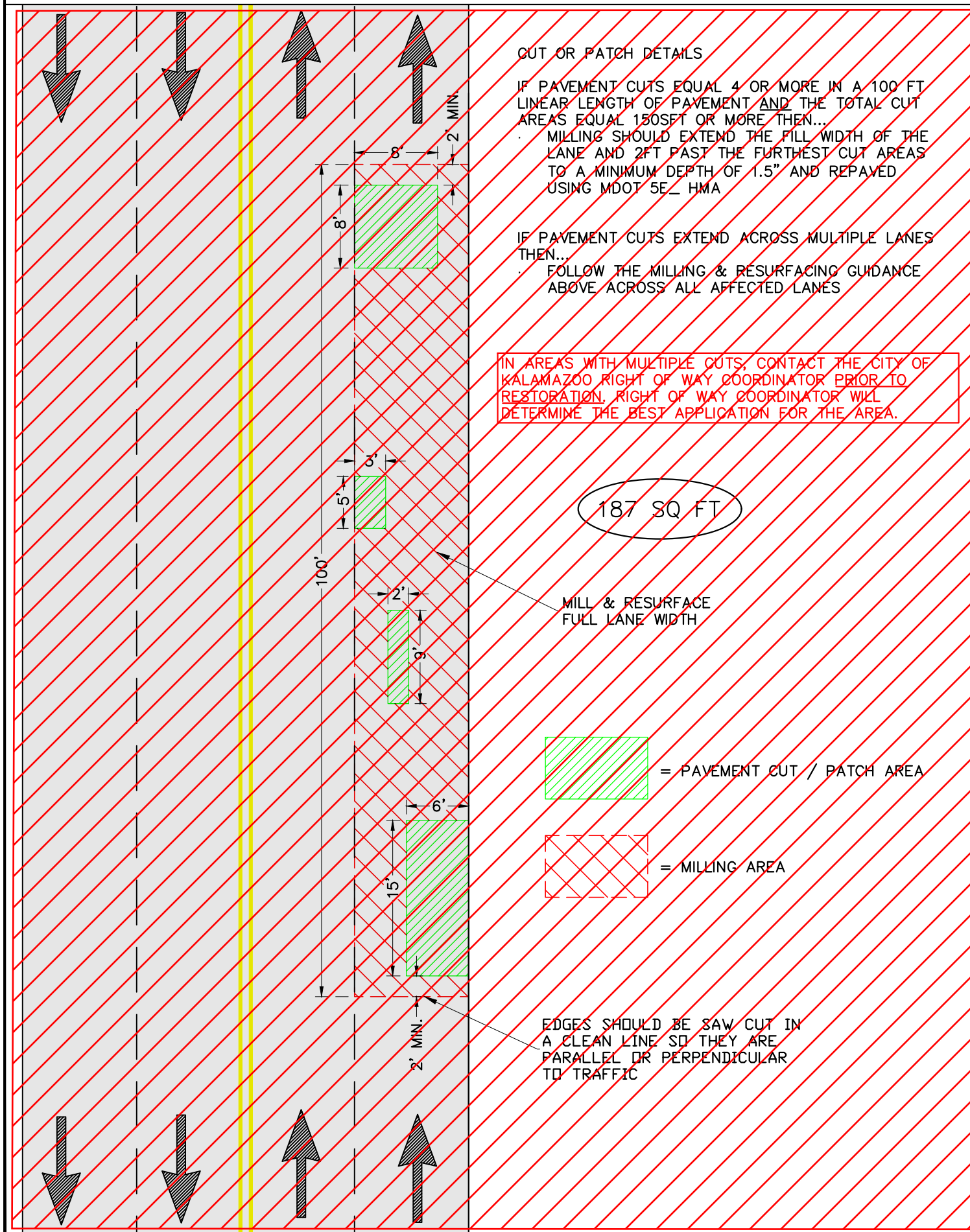
254 SQ FT

MILL & RESURFACE FULL LANE WIDTH

 = PAVEMENT CUT / PATCH AREA

 = MILLING AREA

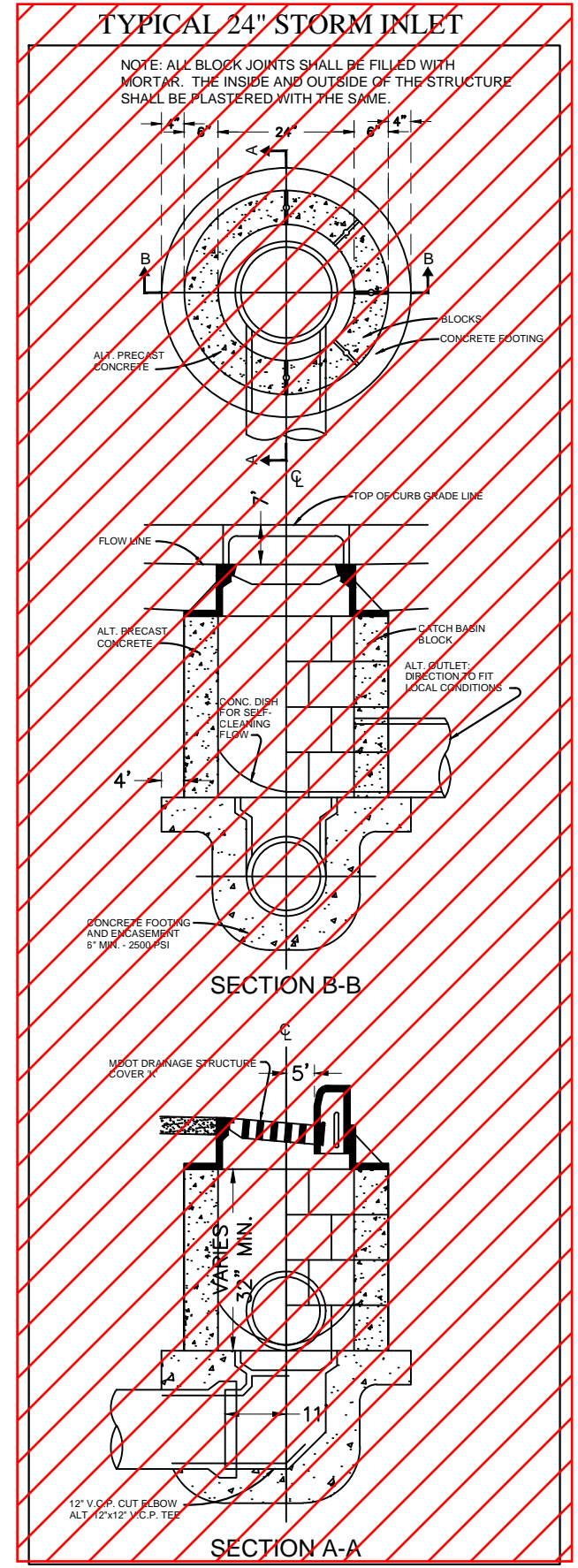
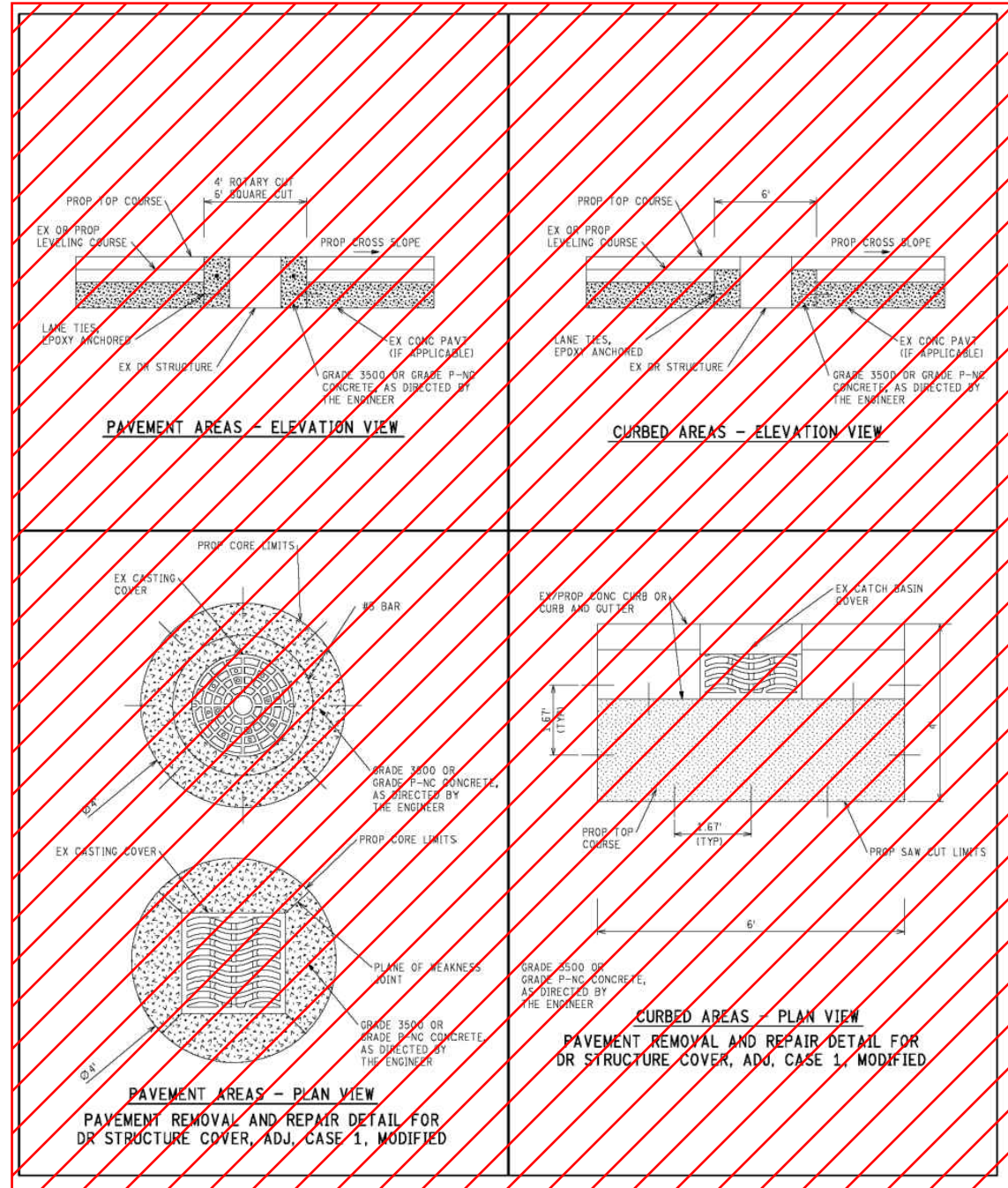
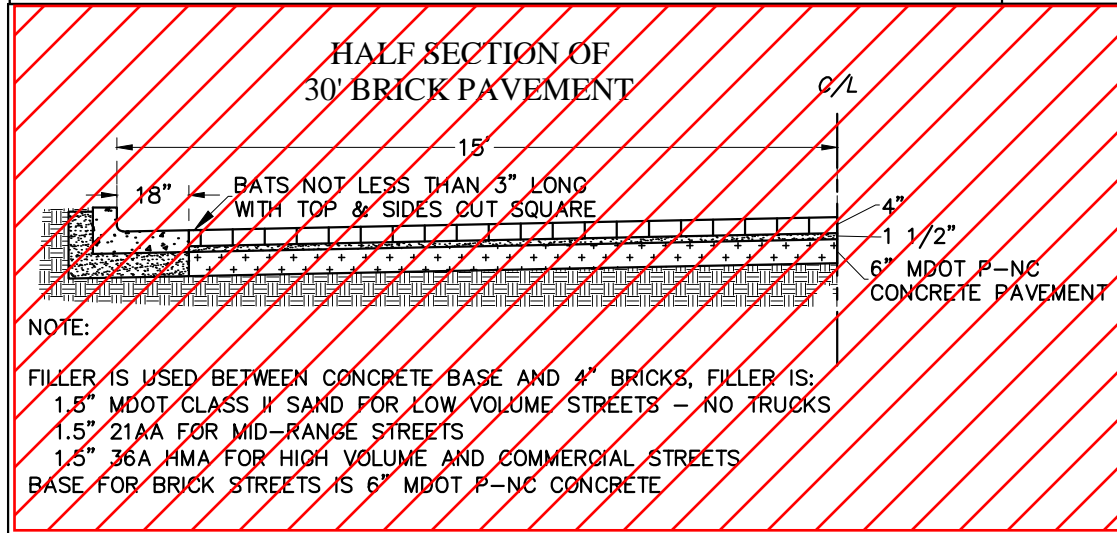
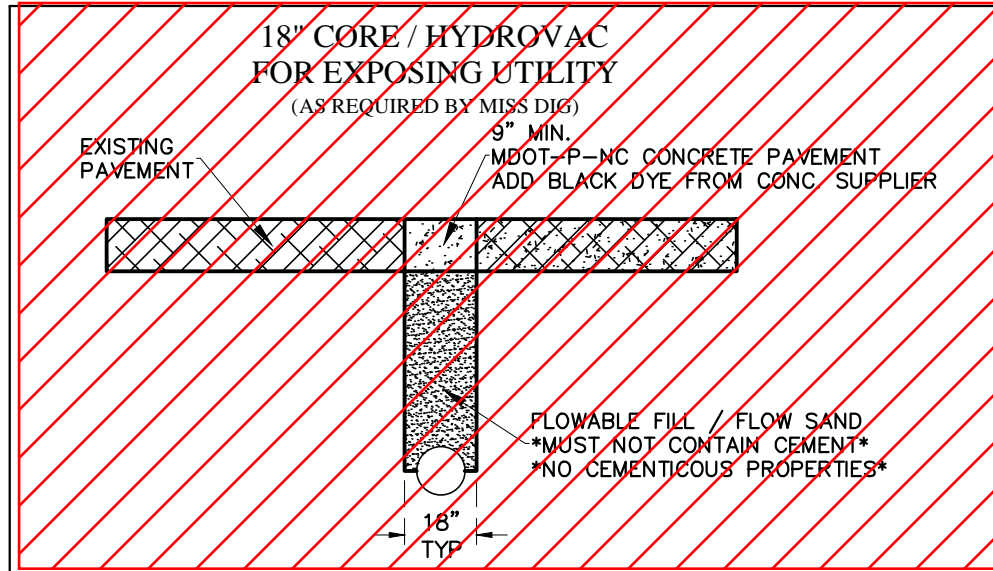
EDGES SHOULD BE SAW CUT IN A CLEAN LINE SO THEY ARE PARALLEL OR PERPENDICULAR TO TRAFFIC



CFS:DMG

3 of 3

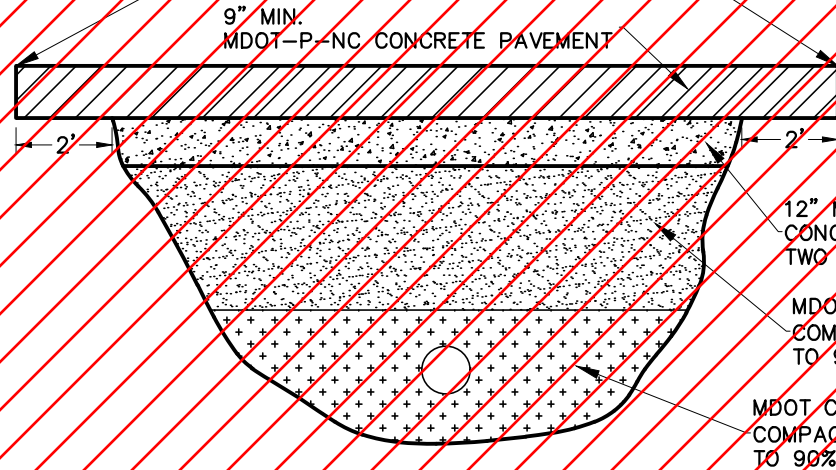
20SP-403A-02  
03-08-22




**WINTER STREET CUT PROCEDURE**  
**CITY OF KALAMAZOO**  
 \*\*\* LOCAL STREETS ONLY \*\*\*

SAW CUT STRAIGHT LINES PARALLEL TO LANE LINES AND PERPENDICULAR TO EDGE LINES  
 SAW CUT 2 FT. WIDER ON ALL SIDES FROM EXCAVATION

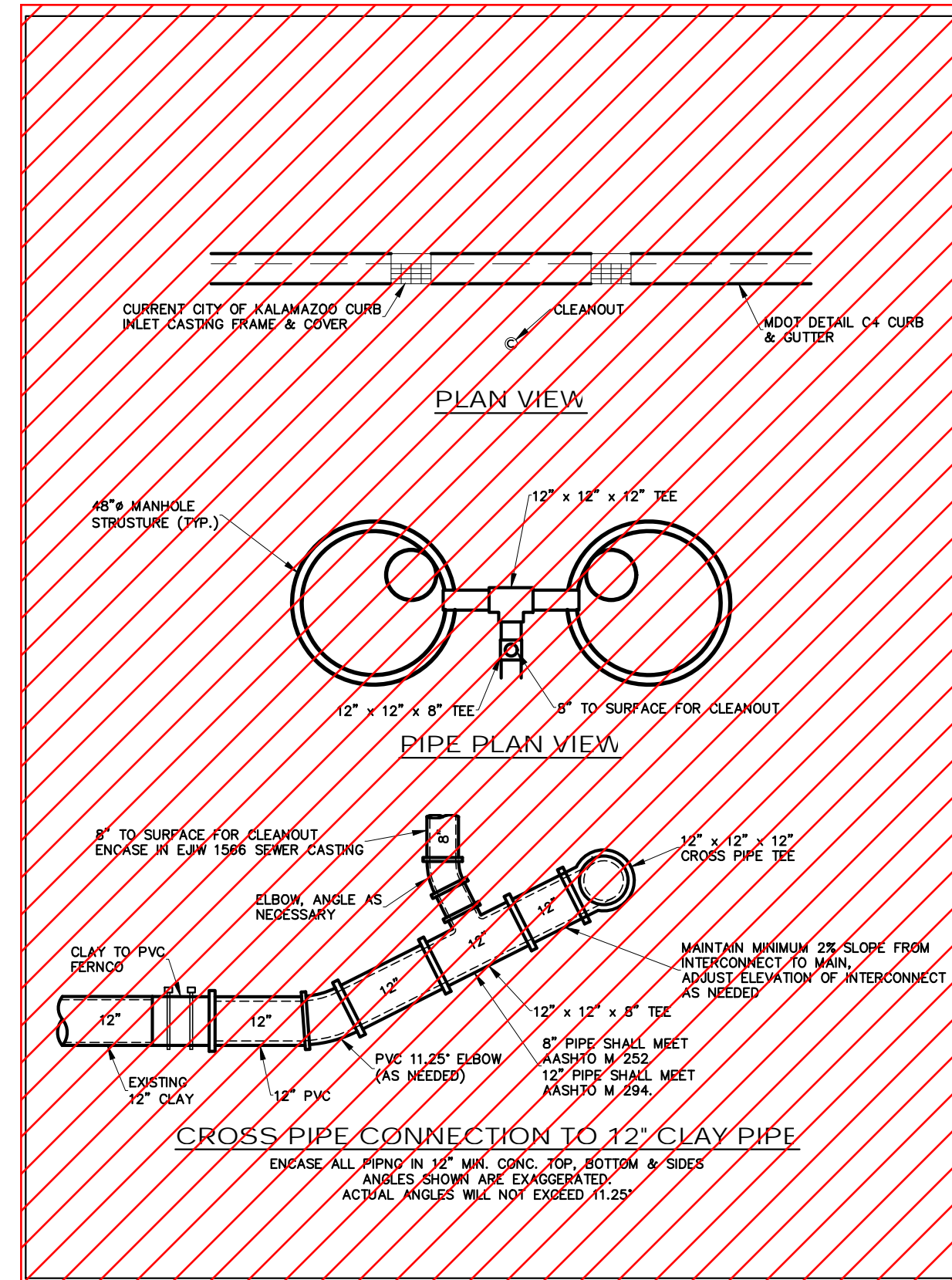
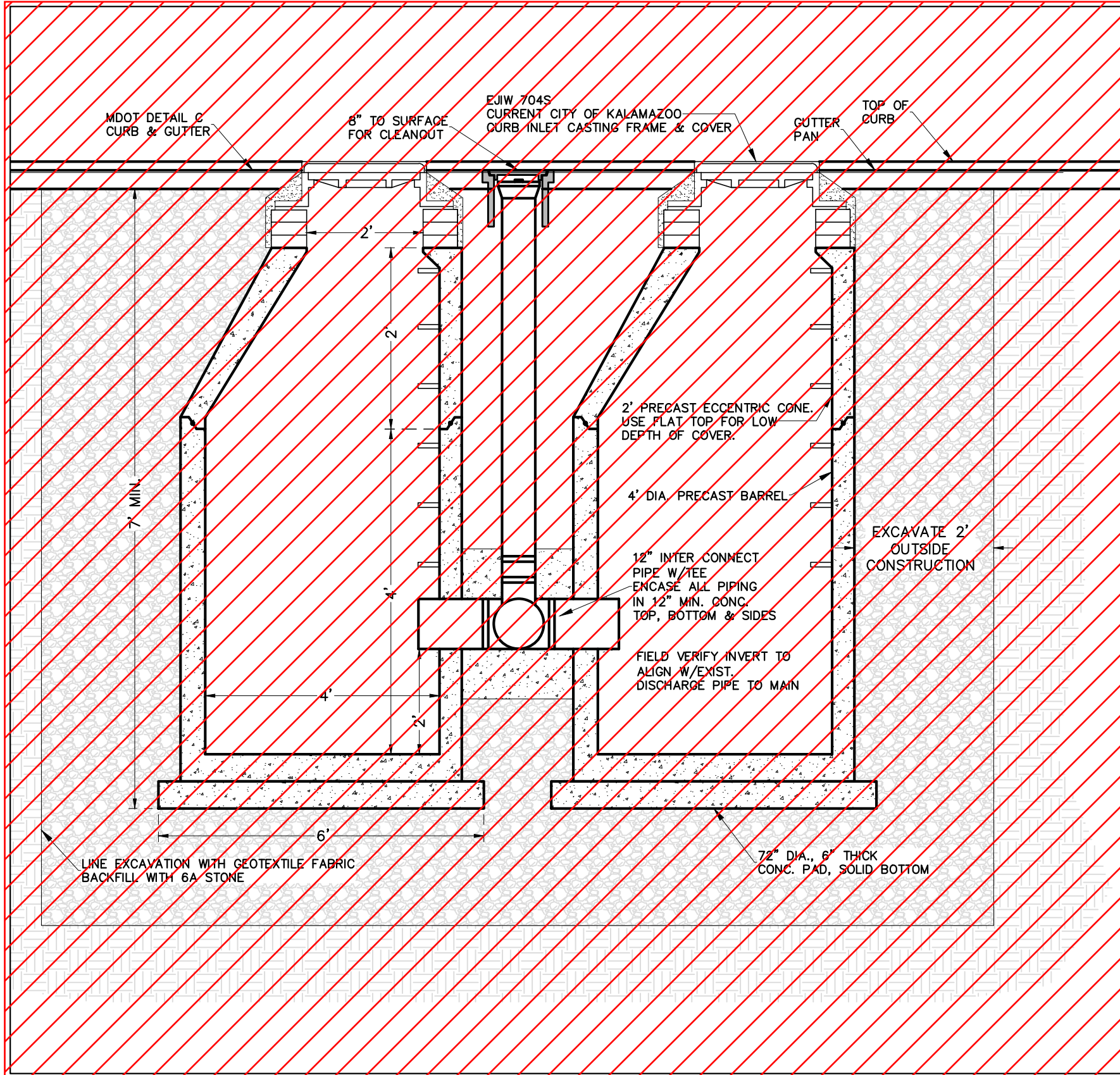
\*MAY USE UP TO 2% NCA AND UP TO 2% MRWR




STANDARD DETAIL - ST-3-A - KALAMAZOO DOUBLE STORM INLET, MODIFIED

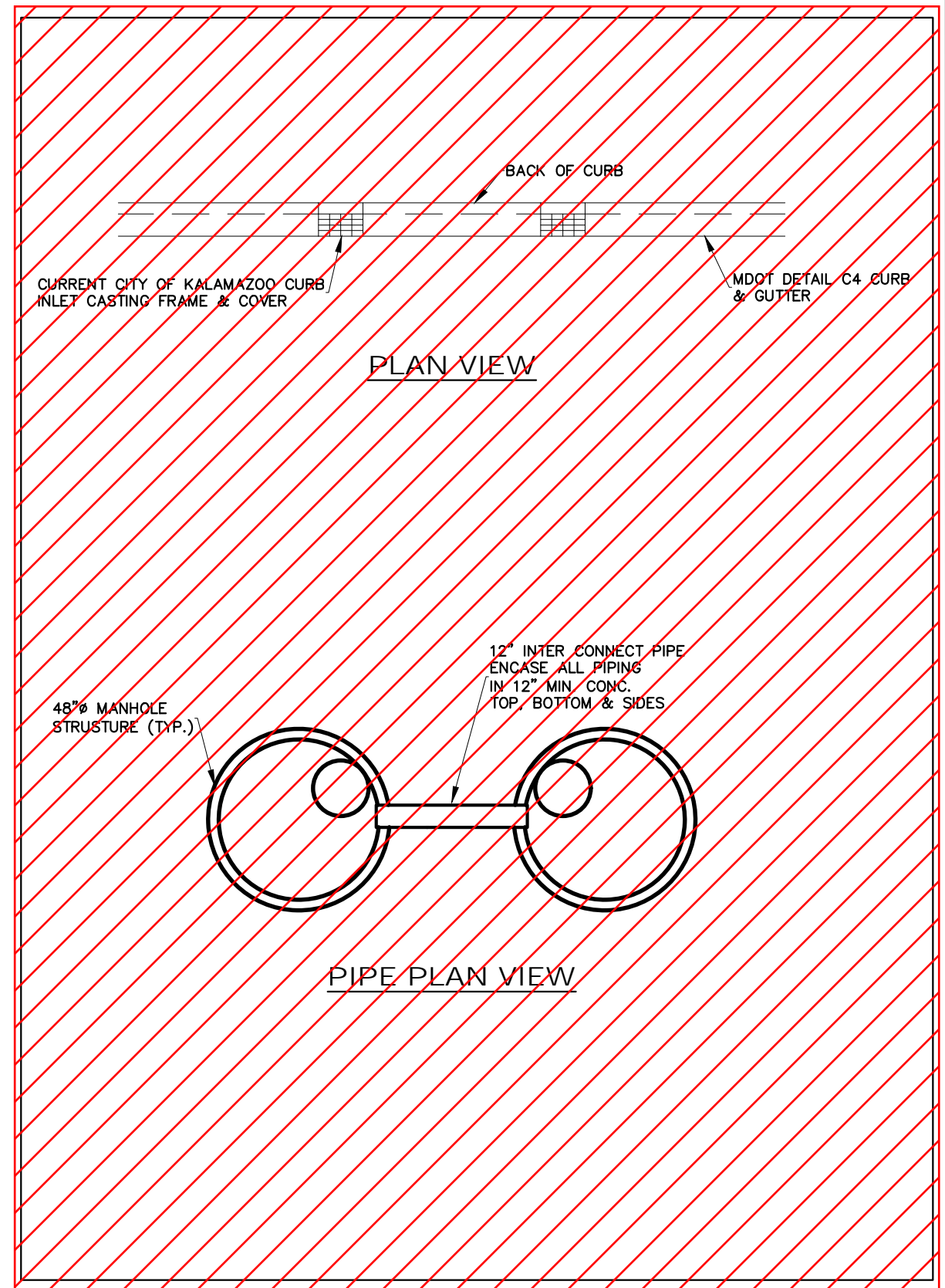
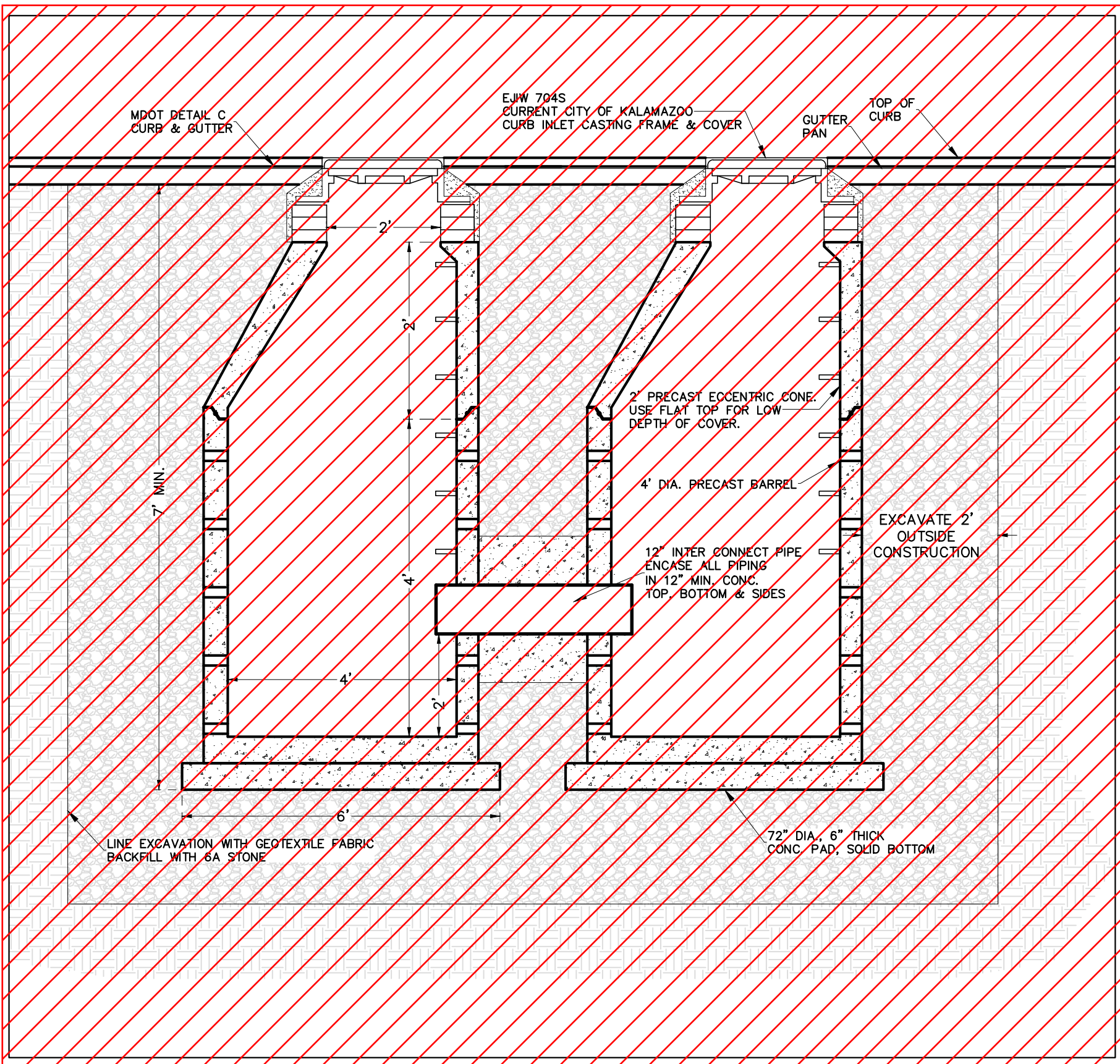

 DEPARTMENT OF PUBLIC SERVICES - Engineering  
 STANDARD DETAILS - SHEET 6  
 CITY OF KALAMAZOO

DESIGNED	GHW / JJB	SCALE	
DRAWN	GHW / WEE	VERTICAL	NOT TO SCALE
QA/QC	JJB	HORIZONTAL	NOT TO SCALE
		DATE	04/30/2025



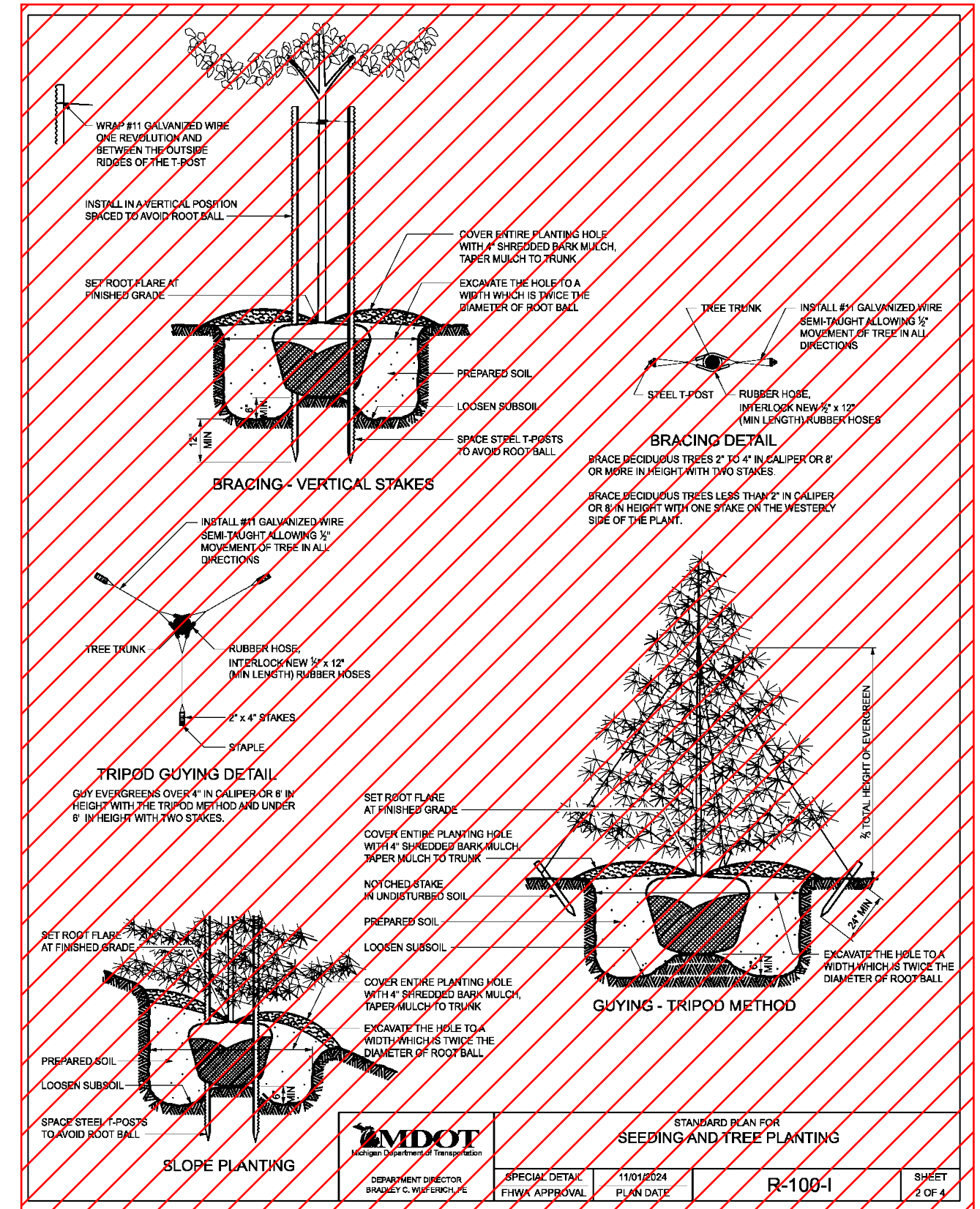
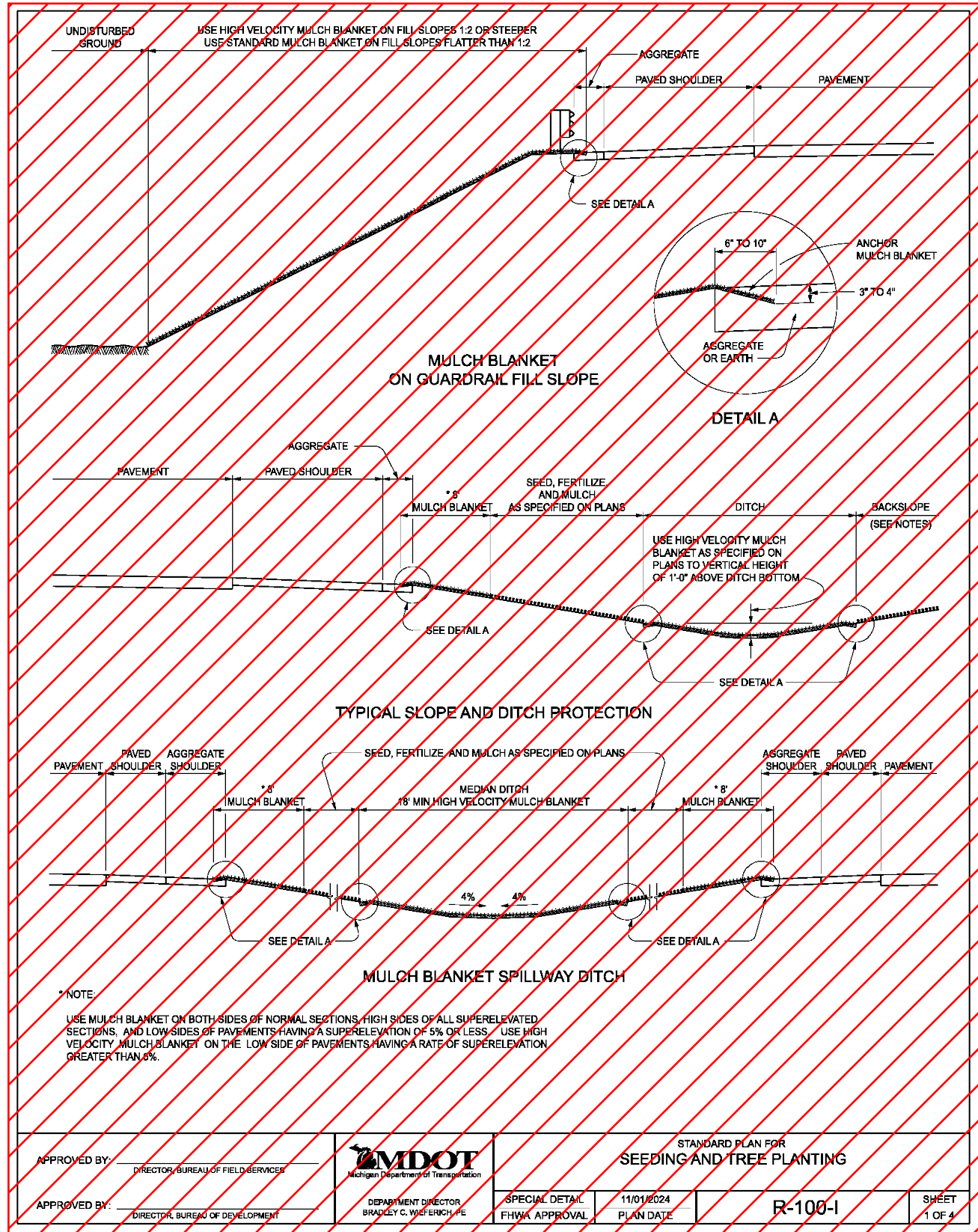
STANDARD DETAIL - ST-4-A - KALAMAZOO DOUBLE STORM INLET, INFILTRATION

 DEPARTMENT OF PUBLIC SERVICES - Engineering STANDARD DETAILS - SHEET 7 CITY OF KALAMAZOO		SCALE VERTICAL NOT TO SCALE HORIZONTAL NOT TO SCALE DATE 04/30/2025
DESIGNED	GHW / JJB	
DRAWN	GHW / WEE	
QA/QC	JJB	

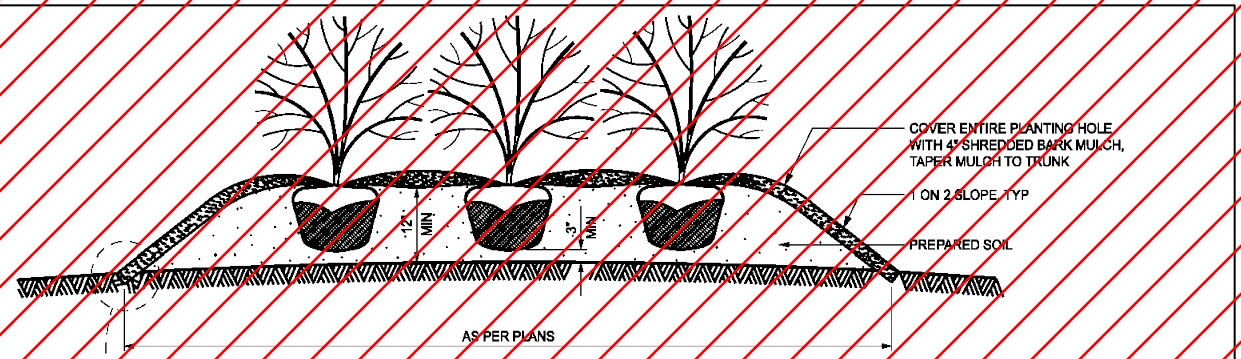


# SEEDING & TREE PLANTING

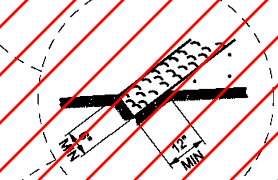
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QA/QC	JJB	HORIZONTAL	NOT TO SCALE
		DATE	04/30/2025



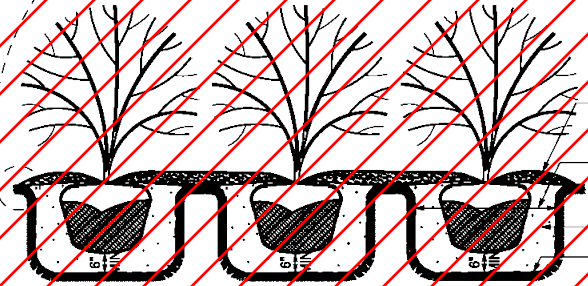
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QA/QC	JJB	HORIZONTAL	NOT TO SCALE
		DATE	04/30/2025



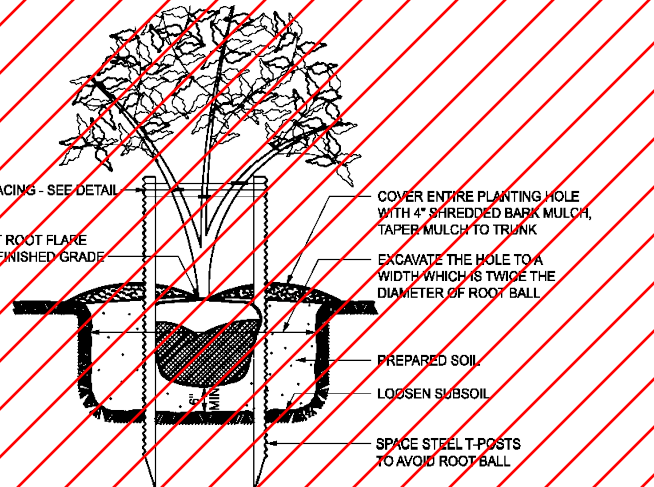
RAISED SHRUB BED DETAIL



SHRUB BED EDGING DETAIL



SHRUB BED DETAIL

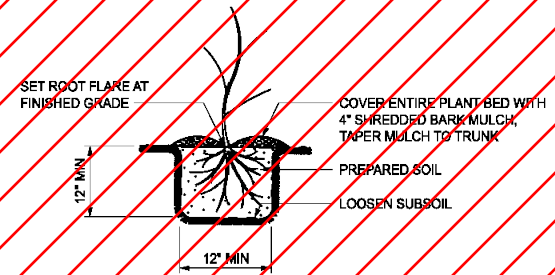


MULTIPLE STEM TREES

INCLUDE SHRUB BEDS IN THE FIRST AND SECOND WATERING AND CULTIVATION.  
 CUT 8" x 12" (MIN) EDGING AROUND THE PERIMETER OF ALL SHRUB BEDS SHOWN ON THE PLANS. SPRAY A NON-PERSISTENT GLYPHOSATE HERBICIDE TO ENTIRE SHRUB BEDS PRIOR TO PLANTING AND BARK PLACEMENT.  
 USE THE PAY ITEM 'SITE PREPARATION, MAX' TO PAY FOR SHRUB BEDS.  
 SET ALL PLANTS PLUMB AND FACE THE BEST SIDE OF THE PLANT IN THE MAIN DIRECTION OF VIEWING.

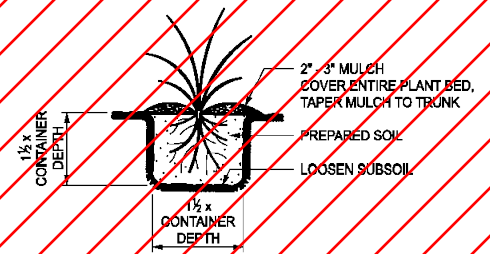
**PLANTING NOTES:**  
 REMOVE ALL EXCAVATED MATERIAL FROM THE SITE IMMEDIATELY.  
 LOOSEN SUBSOIL TO A DEPTH OF 4". LOOSEN EARTH ON SIDES OF PLANT POCKET TO BREAK ANY GLAZING CAUSED BY DIGGINGS.  
 FILL WITH PREPARED SOIL TO 1/2 THE DEPTH OF THE ROOT BALL AND PACK FIRMLY. THEN PUDDLE WITH WATER.  
 BACK-FILL WITH PREPARED SOIL SO THAT AFTER COMPACTION THE AREA IS FLUSH WITH THE SURROUNDING GROUND LEVEL.  
 COVER ENTIRE PLANT POCKET AREA WITH 4" MULCH. PRUNE, BRACE AND GUY.  
 COMPLETELY REMOVE ANY CONTAINERS PLANTS ARE FURNISHED IN BEFORE PLANTING.  
 TREE HEIGHTS ARE SHOWN BEFORE PRUNING. TREE PLANTING DEPTHS ARE SHOWN AFTER SETTLING.

	STANDARD PLAN FOR SEEDING AND TREE PLANTING			
	DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE	SPECIAL DETAIL FHWA APPROVAL	11/01/2024 PLAN DATE	R-100-1
				SHEET 3 OF 4



BARE ROOT PLANTS

**PLANTING BARE ROOT PLANT MATERIAL**  
 REFER TO THE "SPECIAL PROVISIONS FOR BARE ROOT PLANTING" FOR SHIPPING, STORAGE AND HANDLING REQUIREMENTS.  
 KEEP ROOTS IMMERSED IN WATER PRIOR TO PLANTING TO MAINTAIN ROOT MOISTURE.  
 PRUNE ROOTS AS NECESSARY (TO REMOVE ALL DAMAGED OR BROKEN ROOTS) AND AS REQUIRED BY THE DISTRICT FORESTER OR RESOURCE SPECIALIST.  
 DIG PLANTING HOLES AT LEAST 12" WIDE AND 12" DEEP TO ACCOMMODATE ROOT MASS.  
 SET PLANTS PLUMB WITH THE ROOT SPREAD PUT IN A NATURAL POSITION AT A DEPTH EQUAL TO THE DEPTH AT THE NURSERY.  
 HOLD PLANT FIRMLY AND PUDDLE (NOT TAMP) THE BACKFILL AROUND THE ROOTS WITH WATER. USE SUFFICIENT WATER TO ENSURE SATURATION OF THE BACKFILL, BUT DO NOT OVERWATER, CAUSING A FLOATING SOIL MASS WHICH PREVENTS COMPACTION AND MAY RESULT IN AIR POCKETS ADJACENT TO THE ROOTS. ENSURE BACKFILL IS FLUSH WITH THE GROUND AFTER COMPACTION.  
 COVER ENTIRE PLANT POCKET AREA WITH 4" MULCH AS SHOWN.



PERENNIAL PLANTS

INCLUDE PERENNIAL BEDS IN THE FIRST AND SECOND WATERING AND CULTIVATION.  
 USE FULLY DEVELOPED CONTAINER PLANTS FOR PERENNIALS.  
 EXCAVATE ENTIRE PERENNIAL BED DOWN 12" AND REPLACE WITH 12" OF PREPARED SOIL.  
 USE THE PAY ITEM 'SITE PREPARATION, MAX' TO PAY FOR PERENNIAL BEDS.

**SEEDING NOTES:**  
 THIS STANDARD ILLUSTRATES THE TYPICAL USE OF SEEDING WITH MULCH (AS THESE ITEMS RELATE TO ROADWAY CONSTRUCTION). USE THE PLANS AND STANDARD SPECIFICATIONS FOR CONSTRUCTION TO DETERMINE THE ACTUAL DESIGN AND MATERIALS USED TO CONSTRUCT THE COMPLETE SECTION (WHICH INCLUDES SEEDING WITH MULCHING).  
 ITEMS CALLED FOR ON THIS STANDARD ARE OPTIONAL FOR EROSION CONTROL MEASURES. SEE STANDARD PLAN R-96-SERIES.  
 USE HIGH VELOCITY MULCH BLANKET ON ALL DITCHES FOR EROSION CONTROL.  
 SEED, FERTILIZE, AND MULCH WITH MULCH BLANKET THE FIRST 6' BEHIND THE CURB OR SHOULDER IN URBAN MEDIAN AREAS. FOR THE REMAINING AREAS, SEED, FERTILIZE, AND MULCH WITH MULCH BLANKET (OR STANDARD MULCH ANCHORED IN PLACE WITH A MULCH ADHESIVE OR A MULCH NET).  
 SEED, FERTILIZE, AND TOPSOIL (AS SPECIFIED ON PLANS) ALL AREAS WHERE MULCH BLANKET IS CALLED FOR. NO MULCH OR ANCHORING MULCH IS REQUIRED WHERE MULCH BLANKET IS INSTALLED.  
 APPLY THE FRONT SLOPE RESTORATION TREATMENT TO THE BACKSLOPE.

	STANDARD PLAN FOR SEEDING AND TREE PLANTING			
	DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE	SPECIAL DETAIL FHWA APPROVAL	11/01/2024 PLAN DATE	R-100-1
				SHEET 4 OF 4