

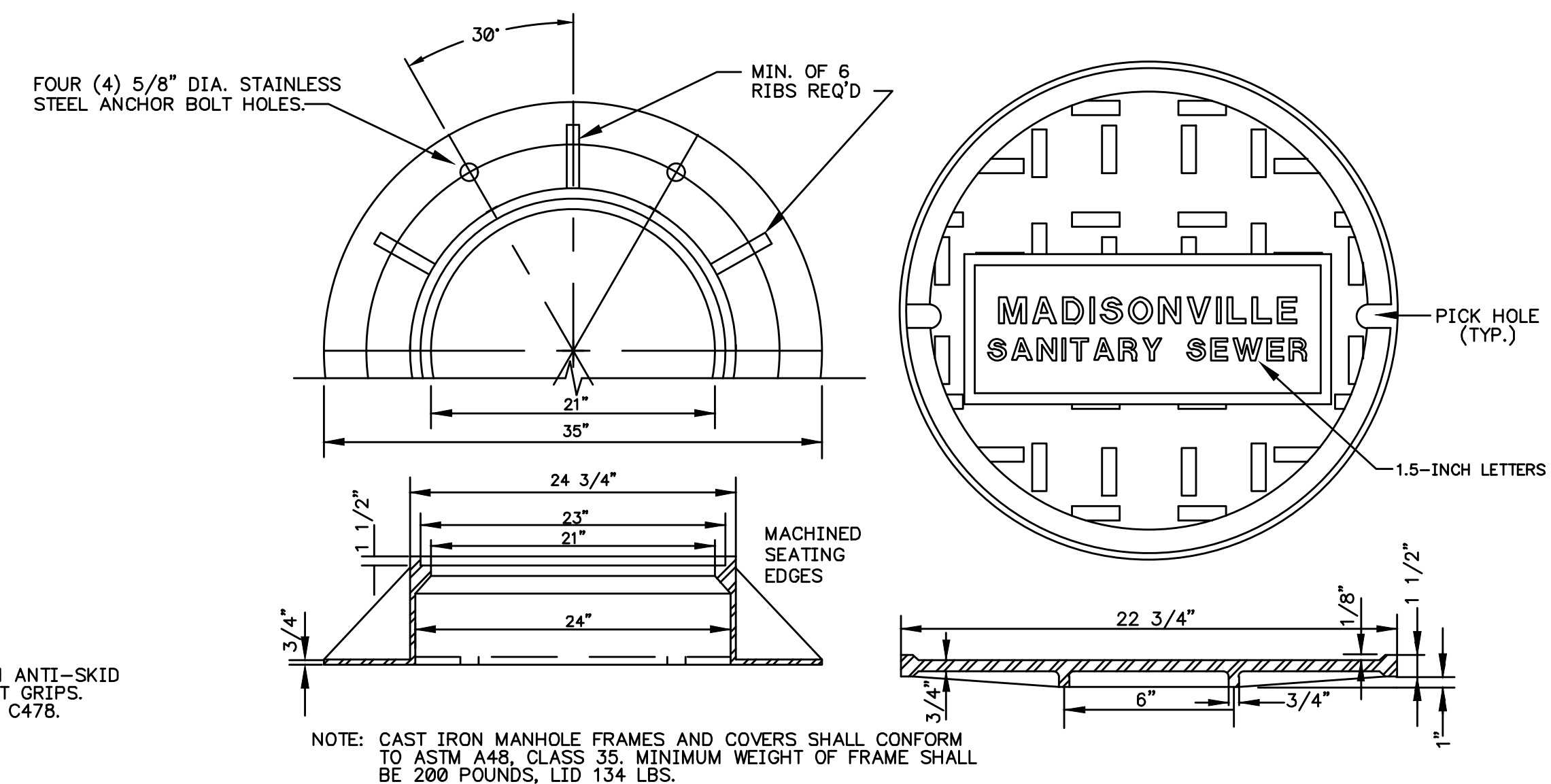
MANHOLE CONSTRUCTION NOTES

- Manholes with precast base sections or bottom slabs must be provided, except base slab is required for Manholes 5 ft. and larger in diameter. Base slab can be round or square. The diameter shall be 1 ft. wider than O.D. of Manhole.
- Precast concrete sections and appurtenances shall conform to the ASTM Standard Specifications for precast reinforced concrete manhole sections, designation C478, latest revision.
- Manholes with precast holes for pipe must be provided with rubber boot (factory installed pipe to manhole gasket) to seal out water.
- All joints on manhole barrel sections shall have a three-way sealing system:
 - Rubber O-Ring or single offset rubber gasket.
 - Butyl mastic joint sealant (Conseal or equivalent).
 - Exterior joint collar consisting of polypropylene fabric with rubberized mastic coating (MacWrap or equivalent).
 Butyl mastic joint sealant is also required between the manhole cone, adjusting sections, and frame.
- Manhole adjusting sections shall be precast concrete. Grade adjustment shall be 2" to 6" max. Only clean adjusting sections shall be used. Each adjusting section shall be laid in a bead of butyl mastic sealant and shall be thoroughly bonded.
- Crown elevation of inflow pipe shall equal or exceed the crown elevation of the outflow pipe.
- Minimum vertical drop across Manhole is 0.10 ft.
- Pipes shall not enter the cone section of the Manhole.
- Benches of Manhole shall be sloped 1" per ft. with smooth finish.
- Minimum Manhole diameters based on inflow and outflow pipe sizes (outside diameter) are as follows:

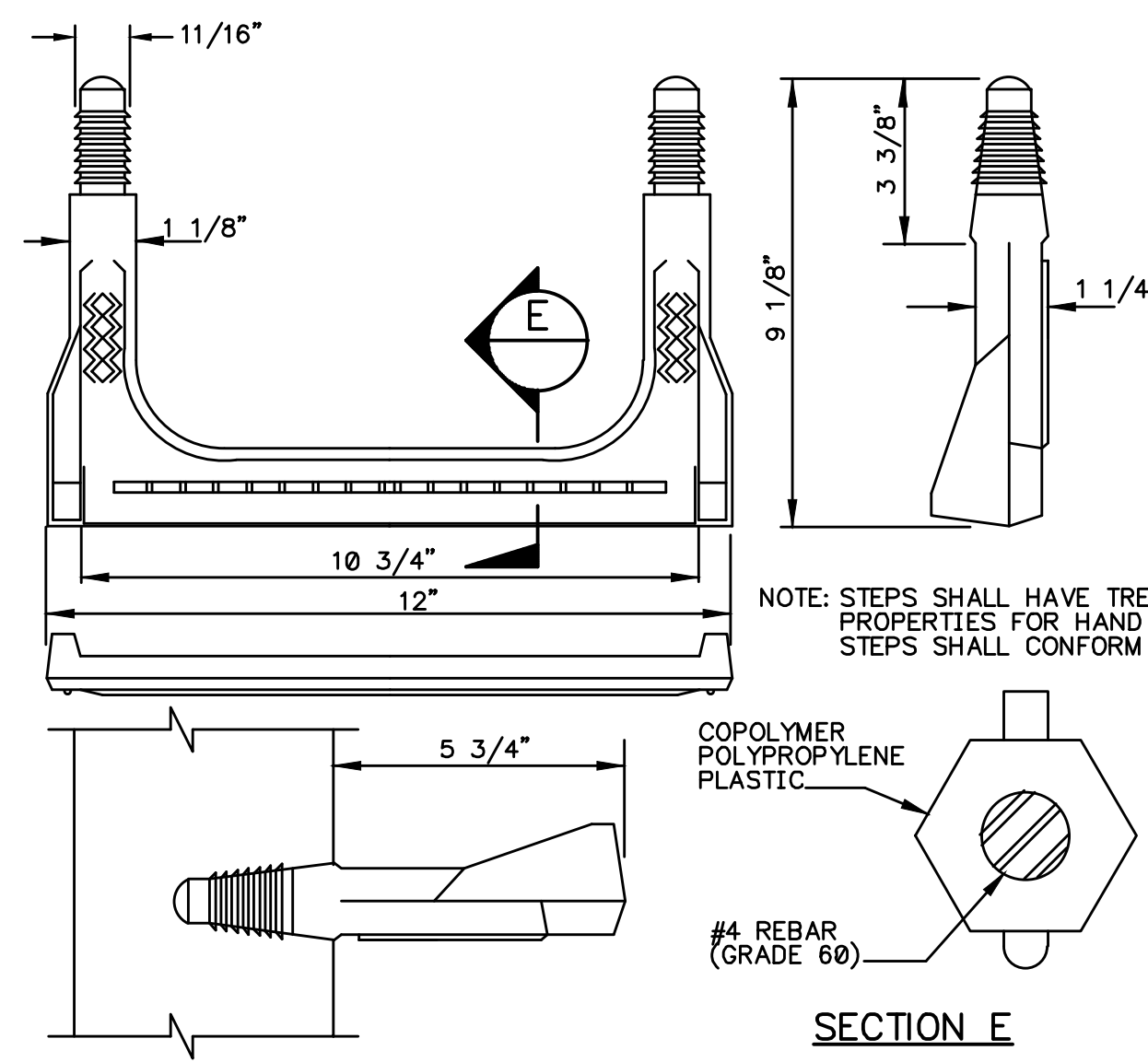
MANHOLE DIA.	MAX. PIPE O.D. ALLOWED*
4 ft.	30 in.
5 ft.	44 in.
6 ft.	51 in.
8 ft.	72 in.

* For straight through pipes to a 45° deflection. Deflection angles greater than 45° for 12 inch or larger sewers will require special approval of the City of Madisonville.

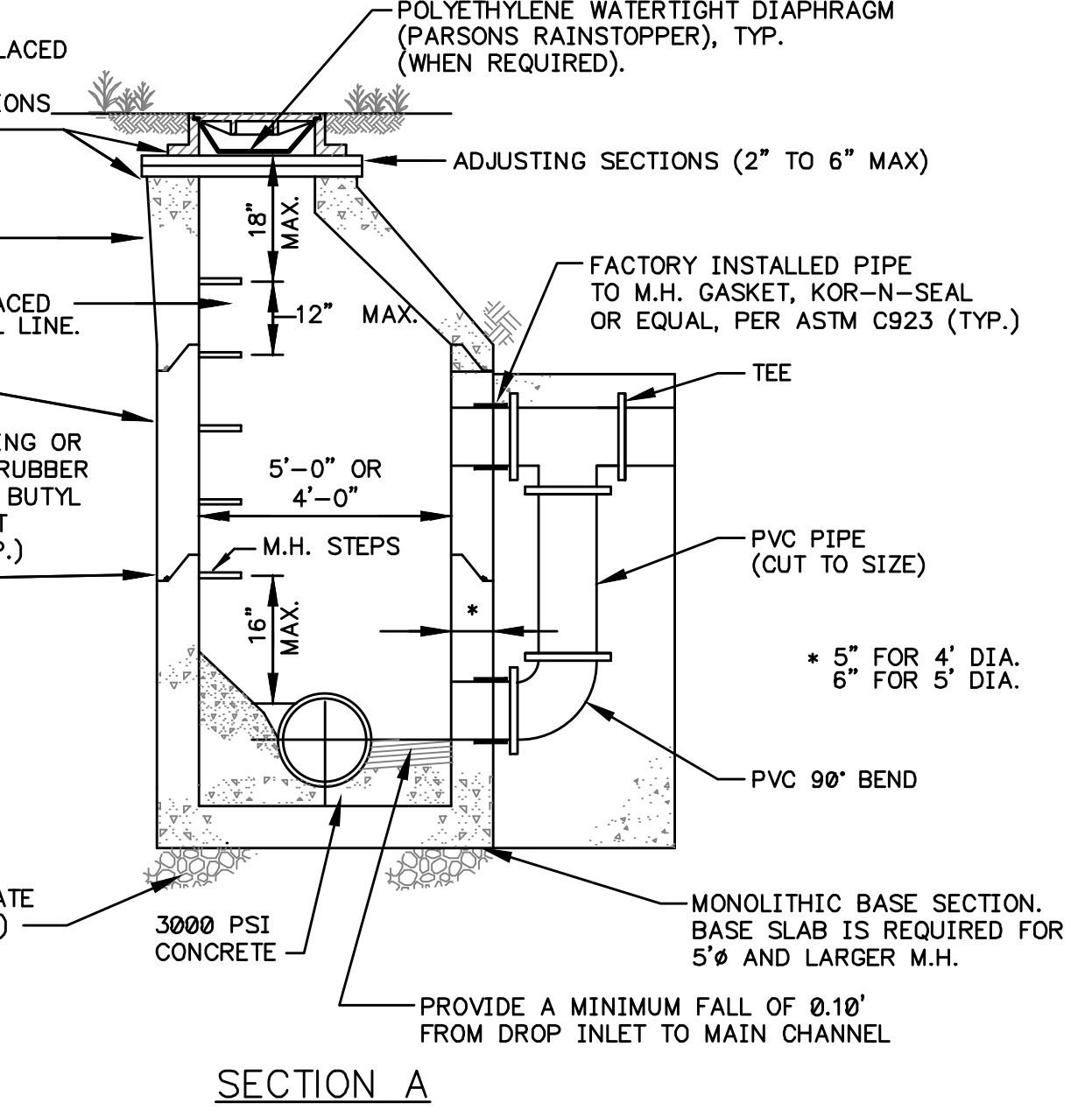
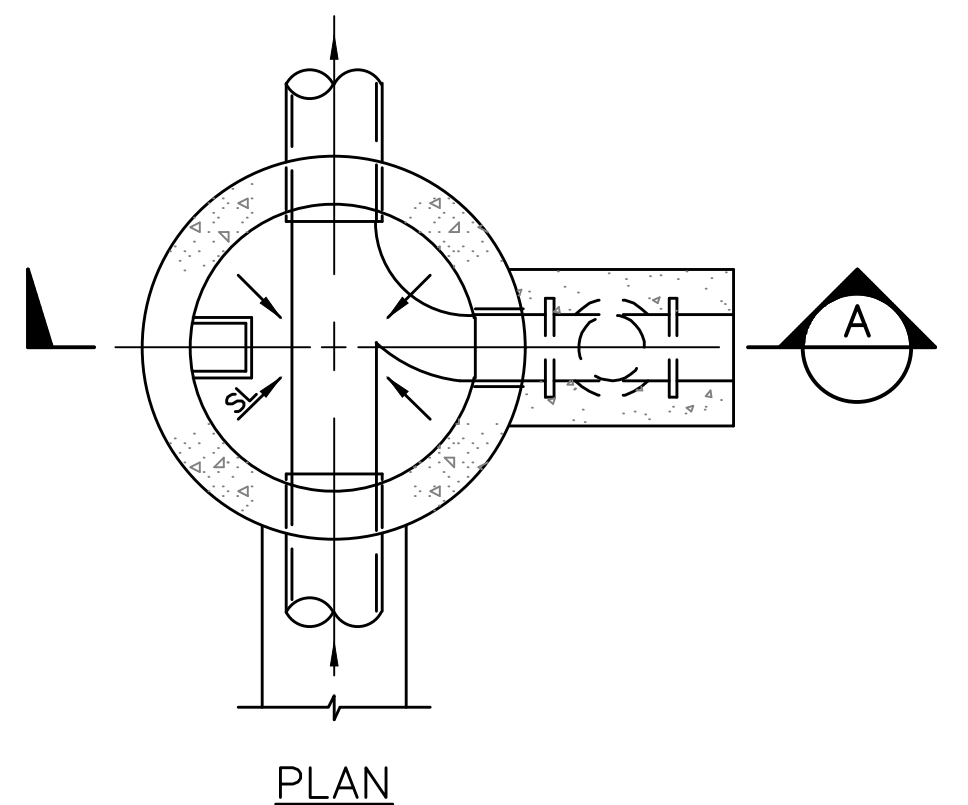
- Manholes exceeding 15 feet in depth and all drop manholes must be approved by the City of Madisonville prior to construction. The precast supplier should be given the manhole depth to properly design reinforcement. Reinforcement shall conform to ACI 318.
- Manholes installed in floodplain areas or areas subject to stormwater runoff or bonding shall be installed with a polyethylene watertight diaphragm (Parsons Rainstopper) under lid. Diaphragm shall have lifting straps and shall not have valves. The City of Madisonville shall specify where manhole diaphragms are to be installed.



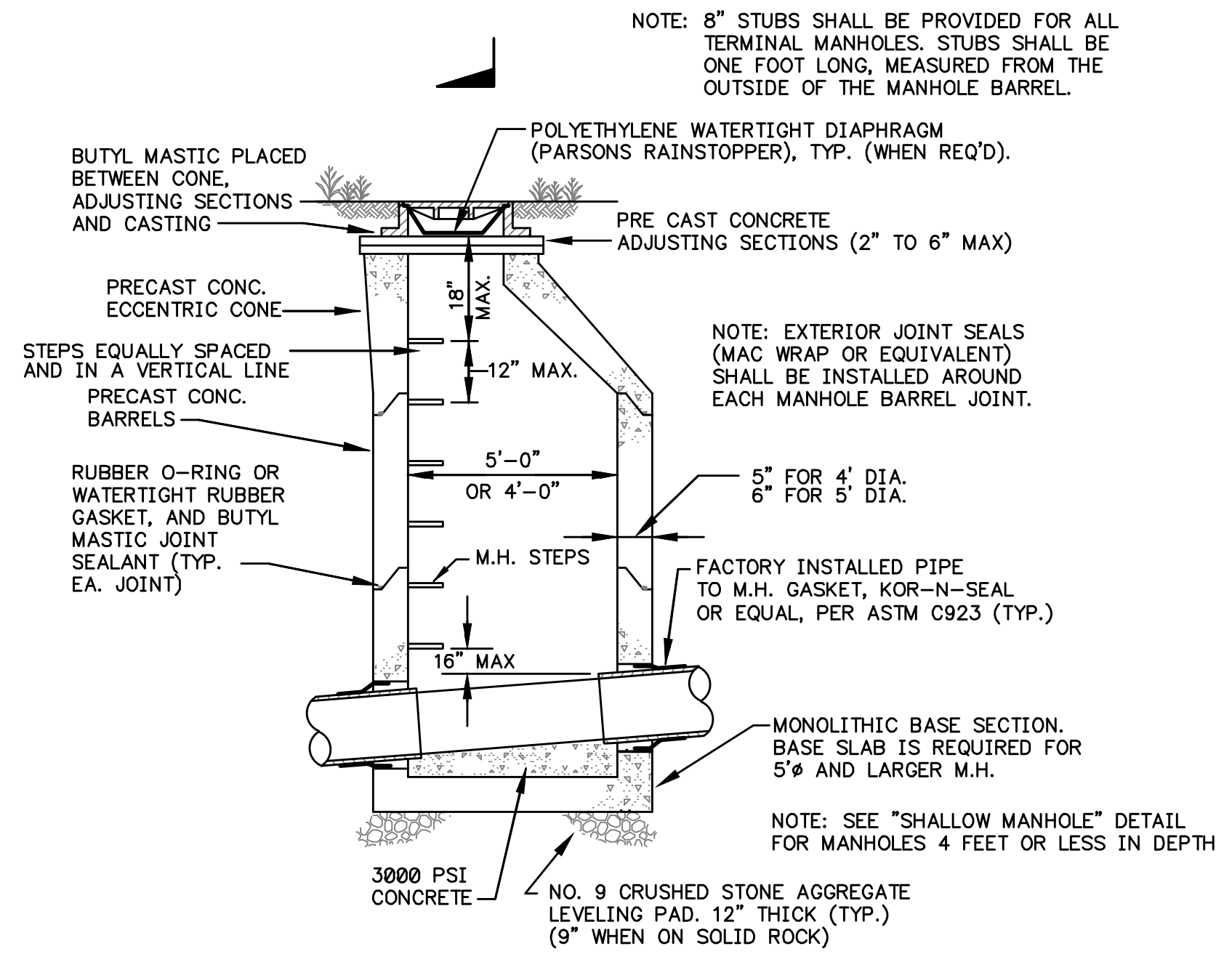
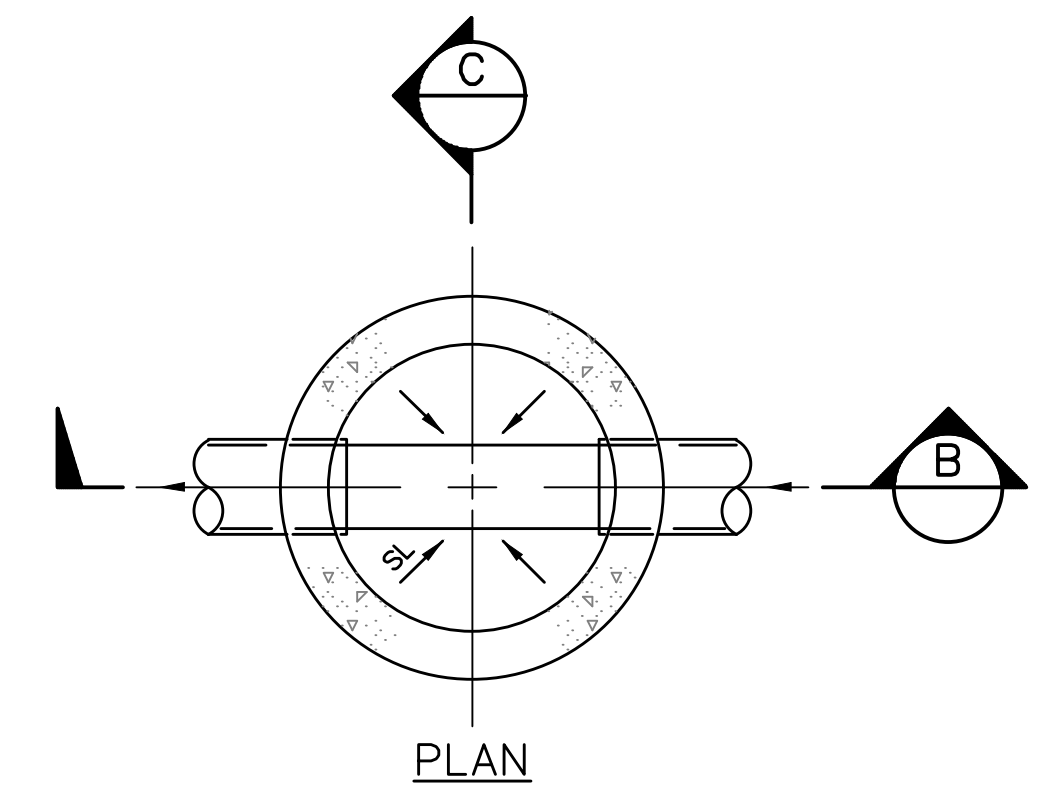
FRAME
COVER
STANDARD MANHOLE FRAME AND COVER
N.T.S.



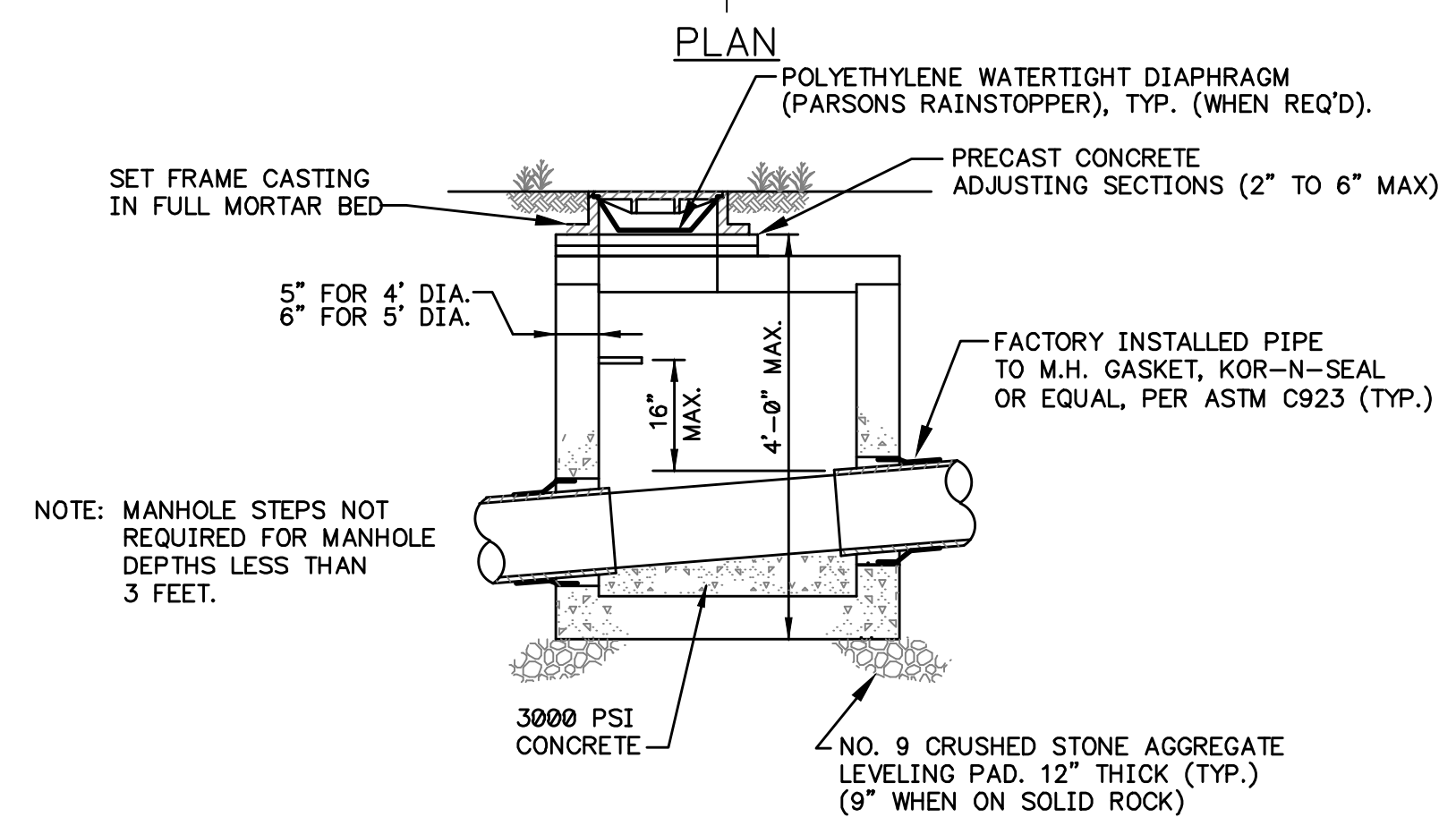
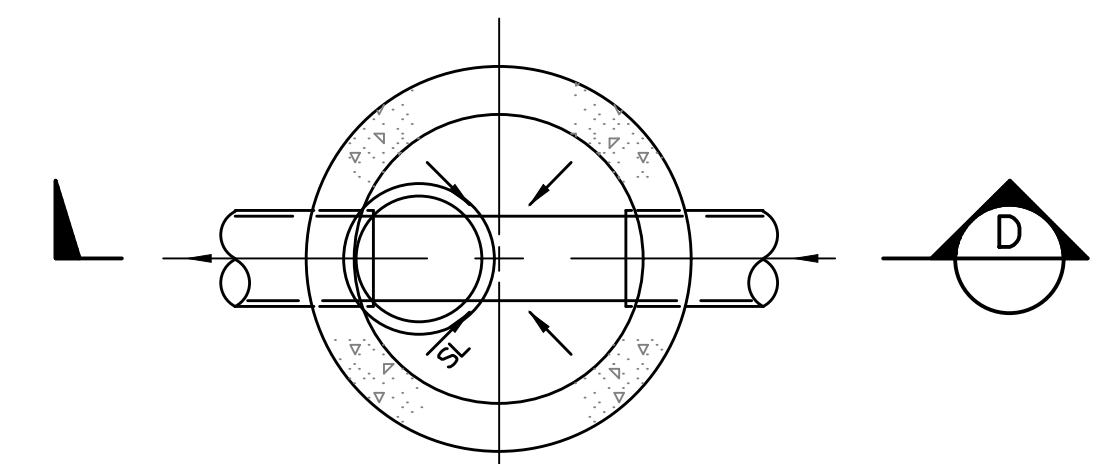
MANHOLE STEP
N.T.S.



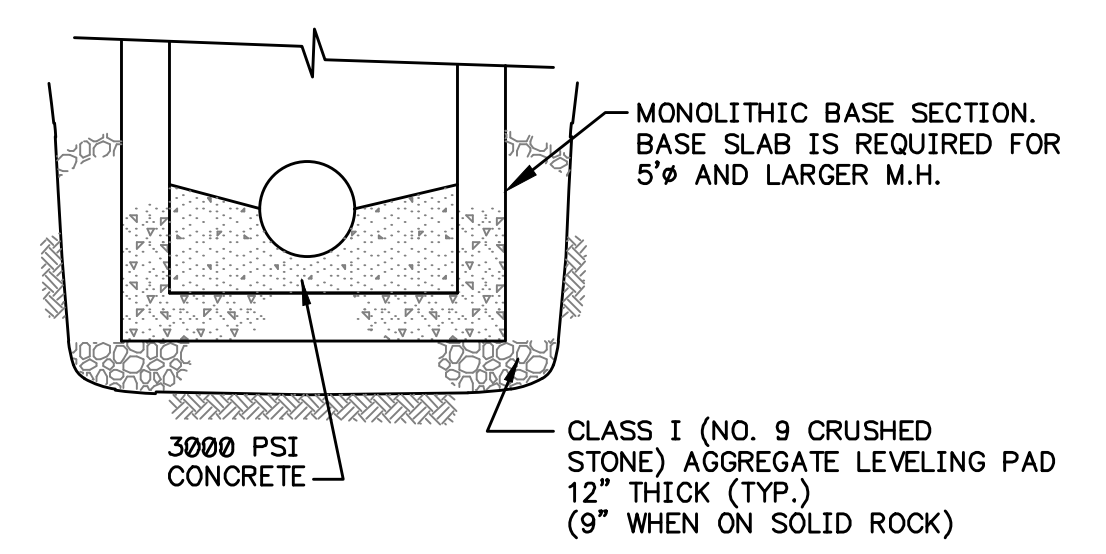
SECTION A
PRECAST DROP MANHOLE
N.T.S.



SECTION B
STANDARD MANHOLE
N.T.S.



SECTION D
SHALLOW MANHOLE
N.T.S.



SECTION C

CITY OF
MADISONVILLE, KENTUCKY
ENGINEERING DEPARTMENT
STANDARD DETAILS - SANITARY SEWER CONSTRUCTION



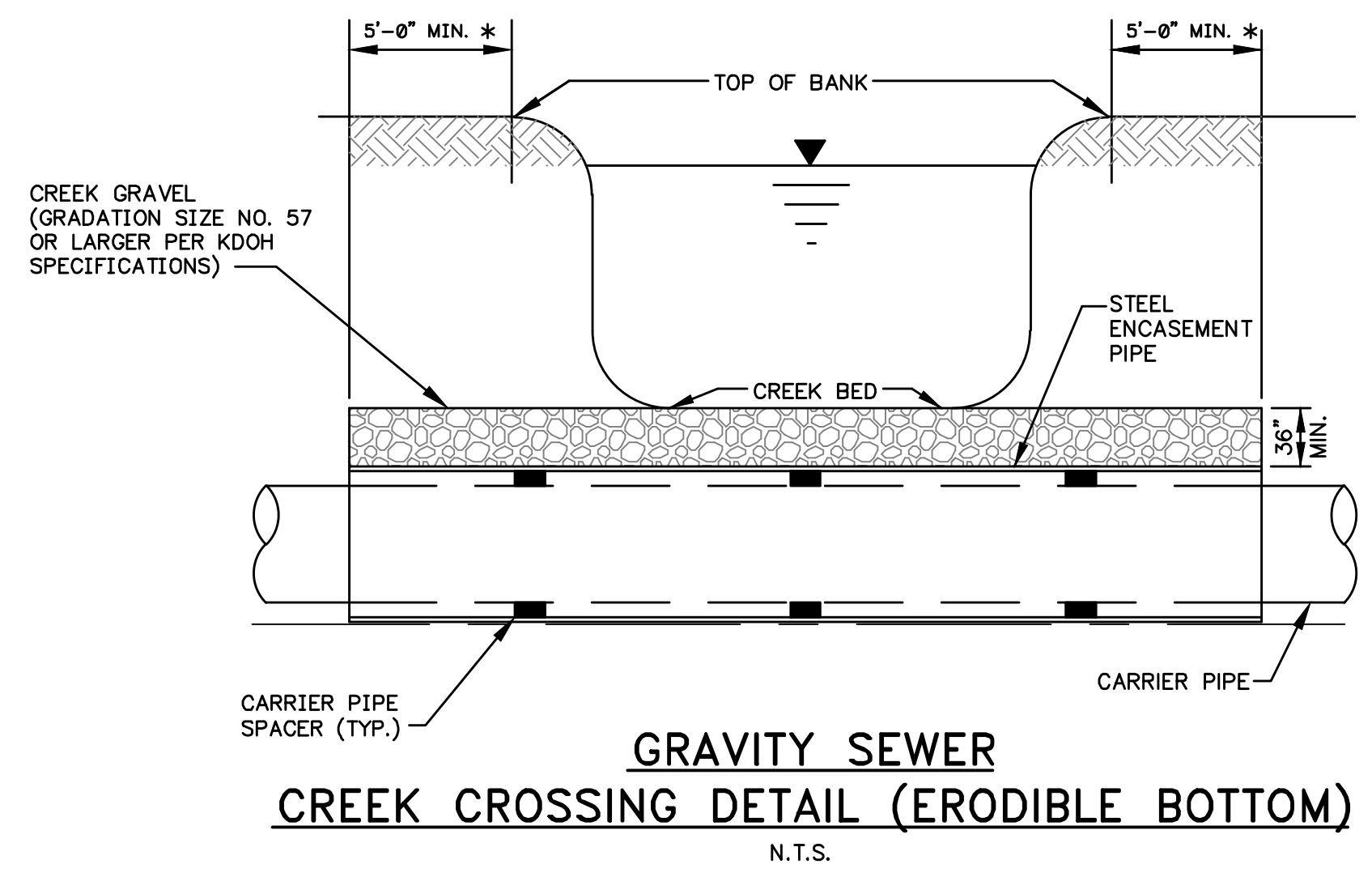
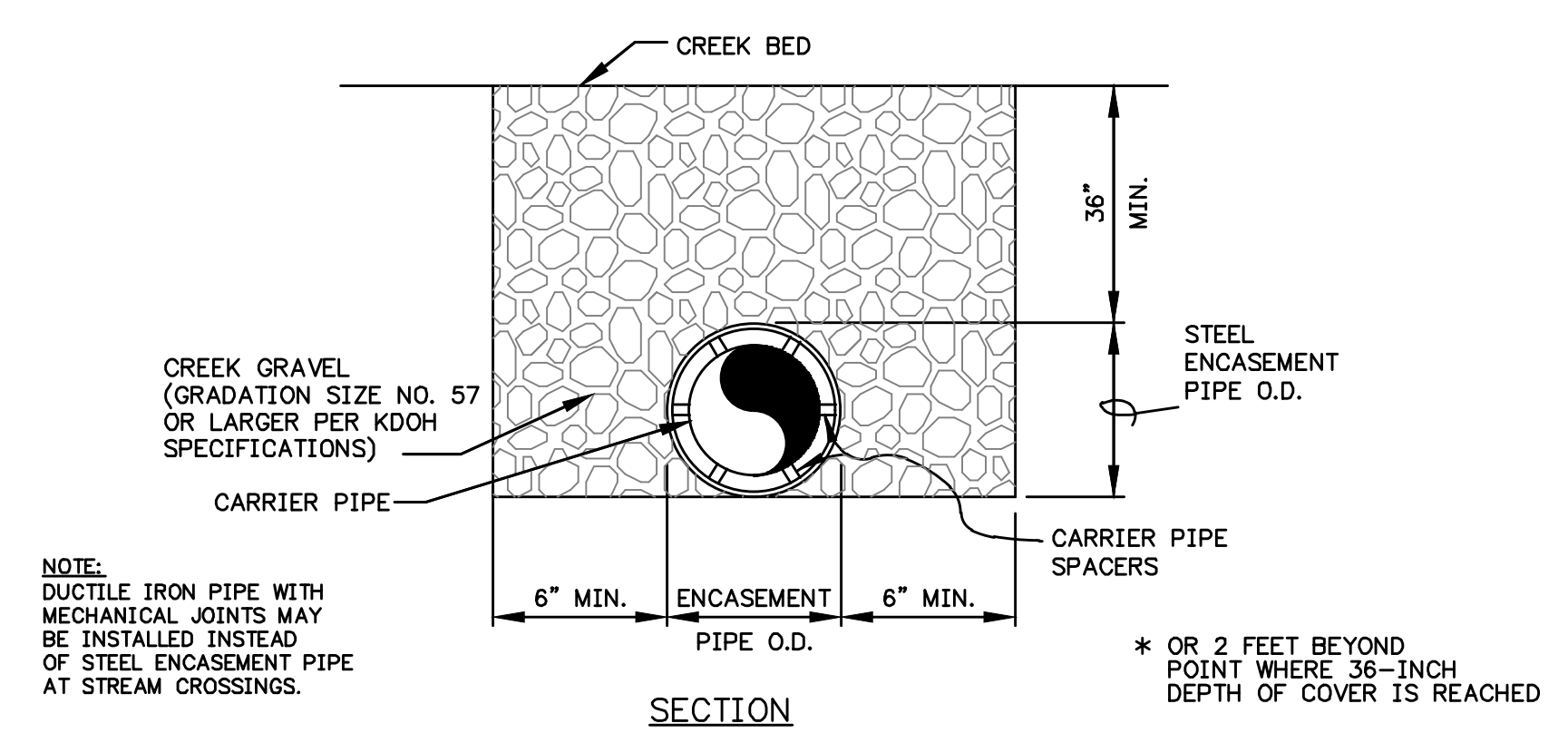
SCALE:	AS NOTED
DATE:	JULY 2002
JOB NO.:	
DESIGNED:	RKS
DRAWN:	PTH
CHECKED:	
Q/C:	

OWNER APPROVAL:
BY: _____
TITLE: _____

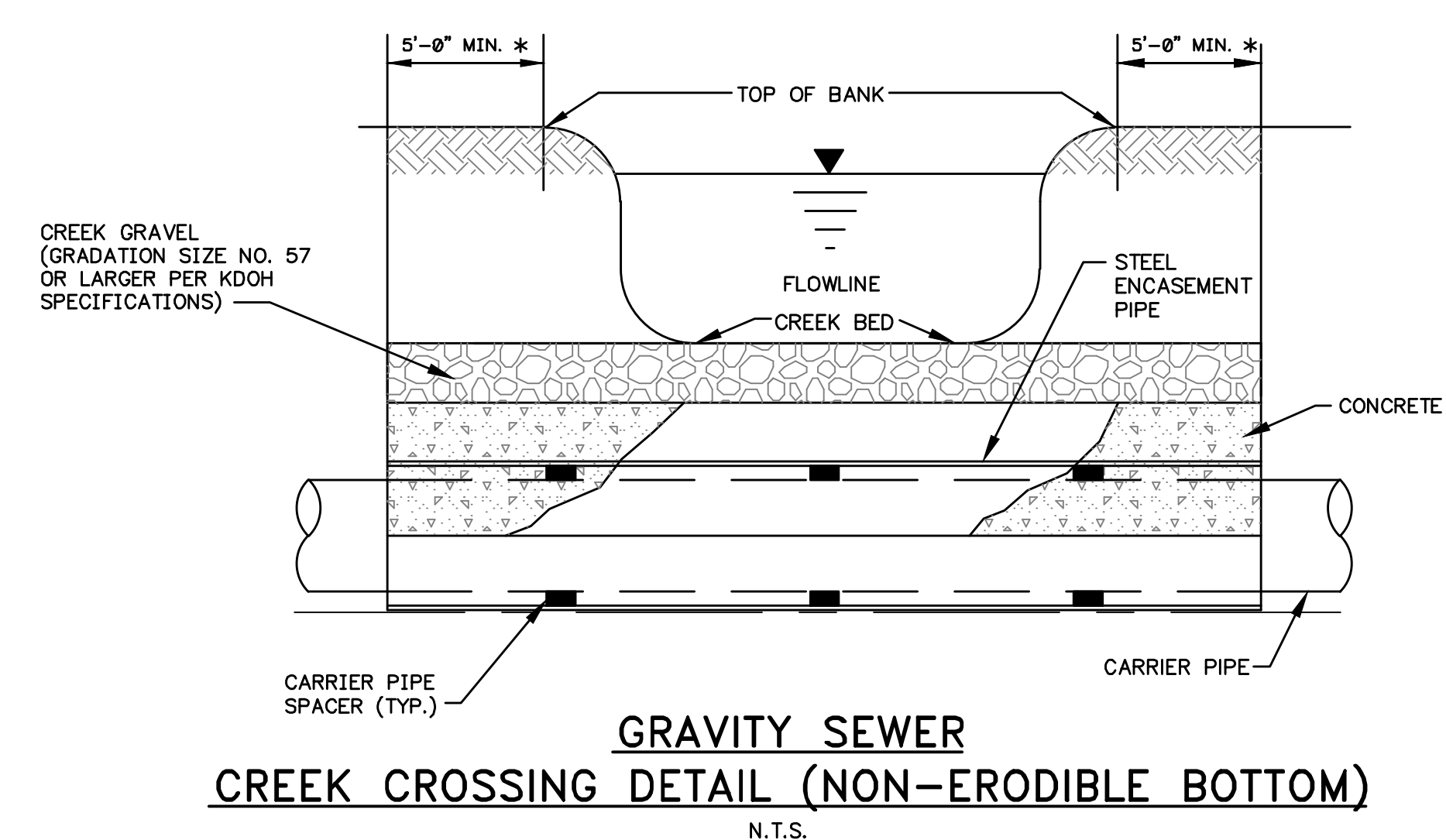
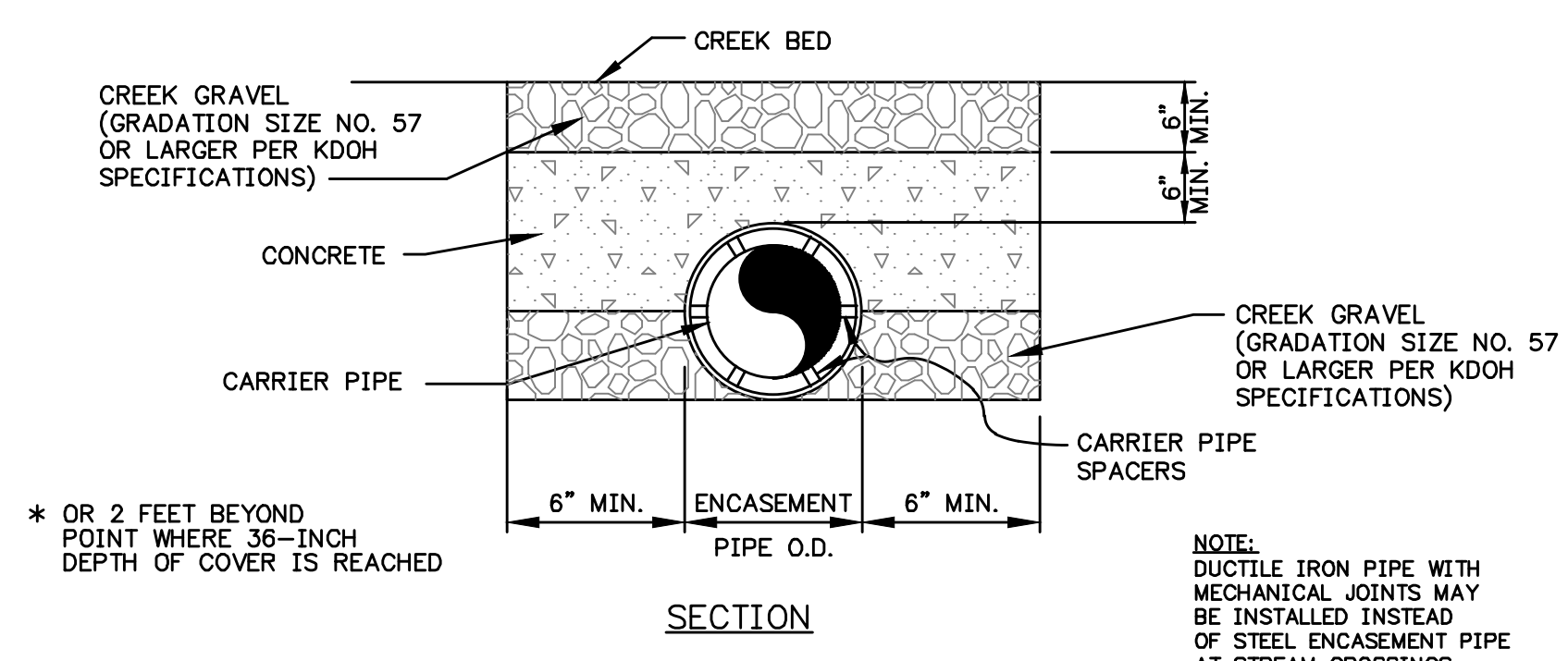
REVISIONS:
NO.: _____ DATE: _____

GENERAL SPECIFICATIONS

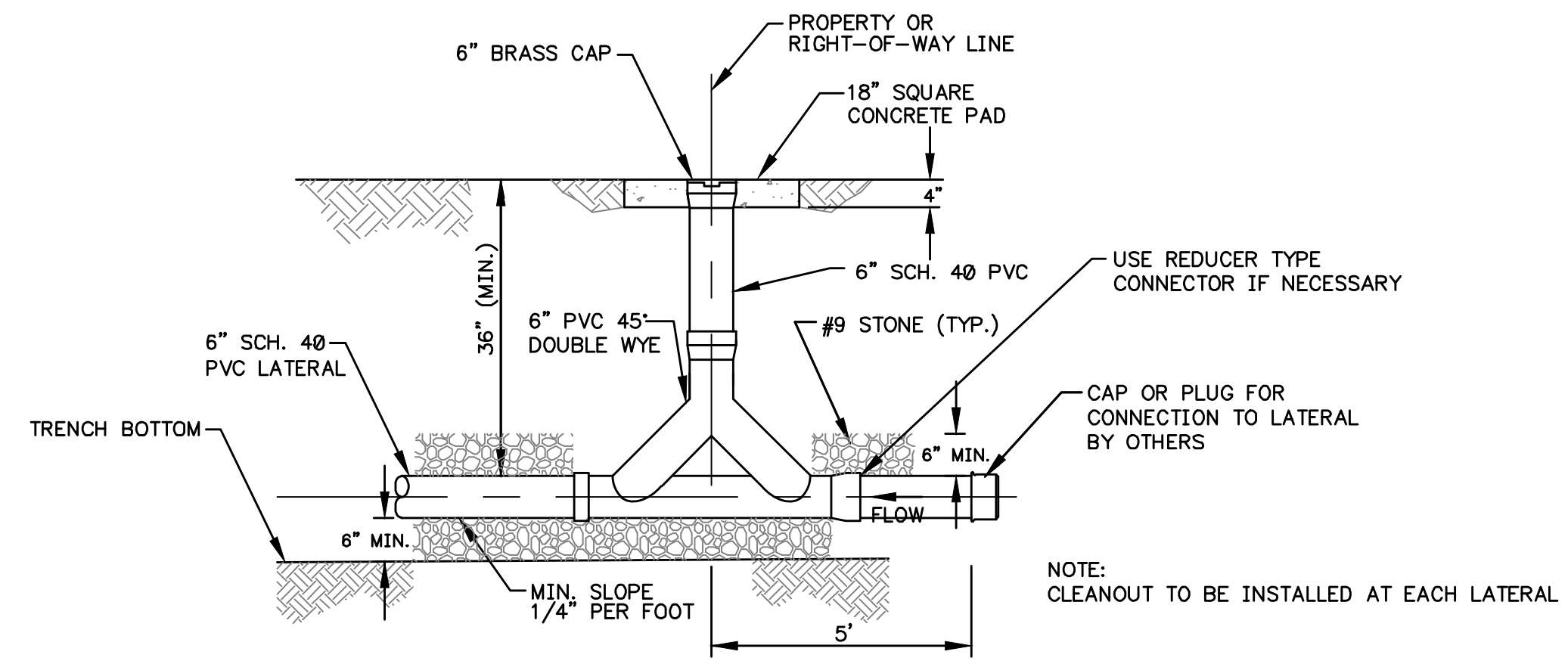
- PVC sewer pipe shall be SDR 35 and shall conform to ASTM D3034. For bury depths greater than 15 feet, the engineer shall select the pipe wall thickness based on an engineering analysis of specific site conditions and subject to approval by the City of Madisonville. DIP shall conform to ANSI A21.50 (AWWA C 150) latest revision. Pipe materials other than PVC or DIP must be approved by the City of Madisonville prior to installation.
- Gravity lines, force mains and lateral lines must be encased in #9 crushed stone as shown on standard details.
- All sewer lines must be installed in a dedicated right-of-way or utility easement. The minimum easement width is 15 feet for 6" through 12" diameter sewers and 20 feet for larger sewers. The main line shall be centered in the easement. Easements shall be properly recorded, with a copy of the stamped documents provided to City of Madisonville. Easements are required for any sewer mains crossing through private property.
- A complete set of Record Drawings shall be provided to the City of Madisonville after the construction has been completed. Each sheet of the Record Drawings shall be signed and dated by a Professional Engineer licensed in the Commonwealth of Kentucky. Revisions to the Record Drawings must be signed and dated on each page.
- Buildings must be set-back from the sewer easement so the building foundation will not be undermined. The set-back must be greater than a 45-degree line from the edge of the trench at the pipe invert to its intersection with the foundation elevation.
- After the Record Drawings are accepted by the City of Madisonville, the City will televise the main lines to verify their condition. Repairs, if necessary, shall be made at the developer's expense prior to acceptance of the sewers. Sewers will not be accepted until the Record Drawings are completed and the main lines have been televised.
- Each lot shall have a separate lateral that does not cross into any other lots. The laterals must extend five (5) feet into the lot.
- The lowest floor of any structure to be provided sewer must be a minimum of one (1) foot higher than the rim elevation of the nearest sanitary manhole. If these requirements cannot be met, an ejector pump will be required to serve the structure. An in-line backflow preventer may also be required. The ejector pump installation must be approved by the City of Madisonville prior to the sewer connection being permitted.
- These drawings and specifications represent standards adopted by the City of Madisonville. These drawings are not a substitute for detailed design and engineering. Sewers shall be designed in accordance with the Recommended Standards for Wastewater Facilities, 1997 Edition (Ten States Standards). Construction plans and specifications must be approved by the Kentucky Division of Water (DOW). A construction permit must be obtained from DOW before sewers can be installed.



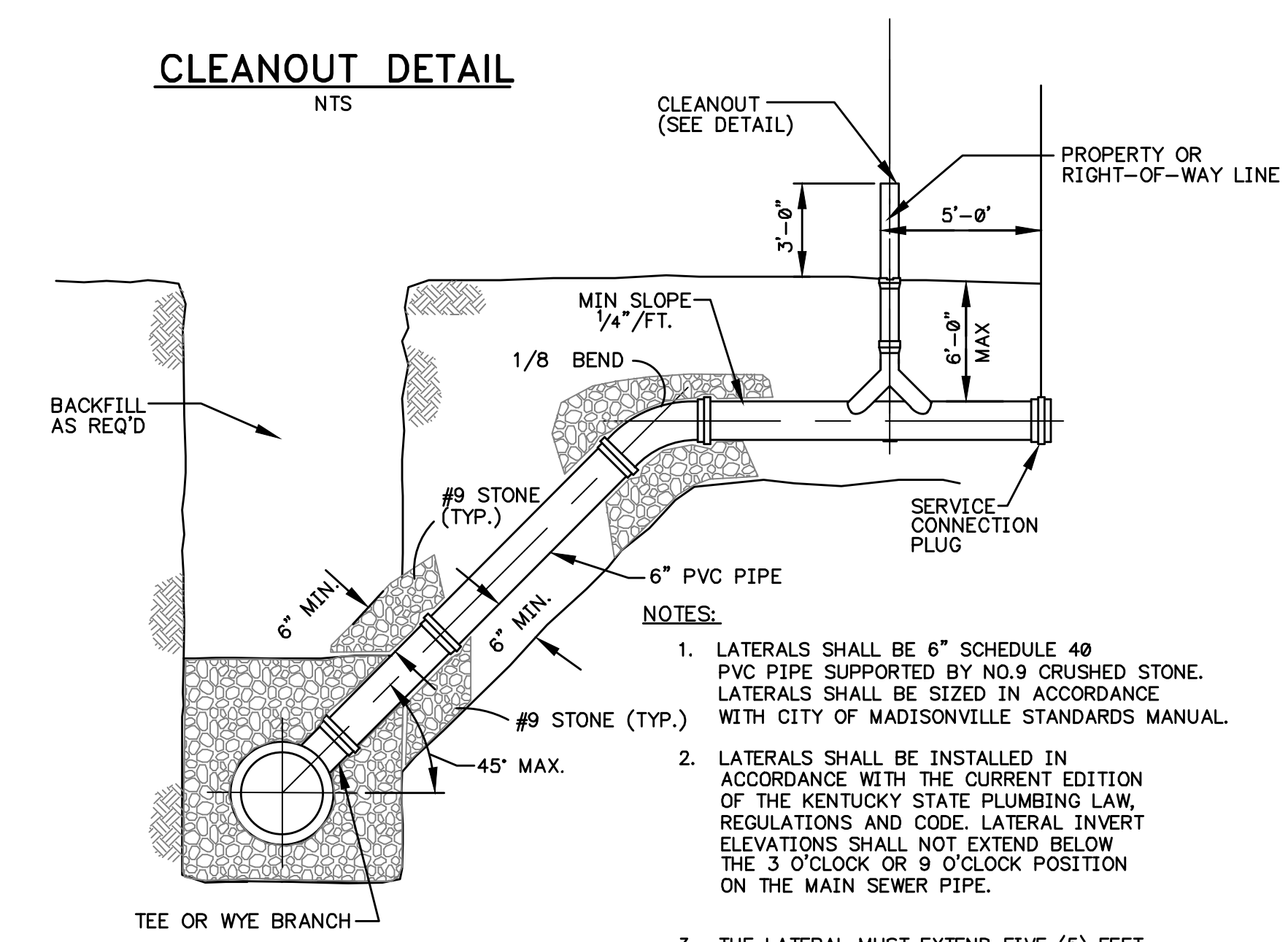
GRAVITY SEWER CREEK CROSSING DETAIL (ERODIBLE BOTTOM)
N.T.S.



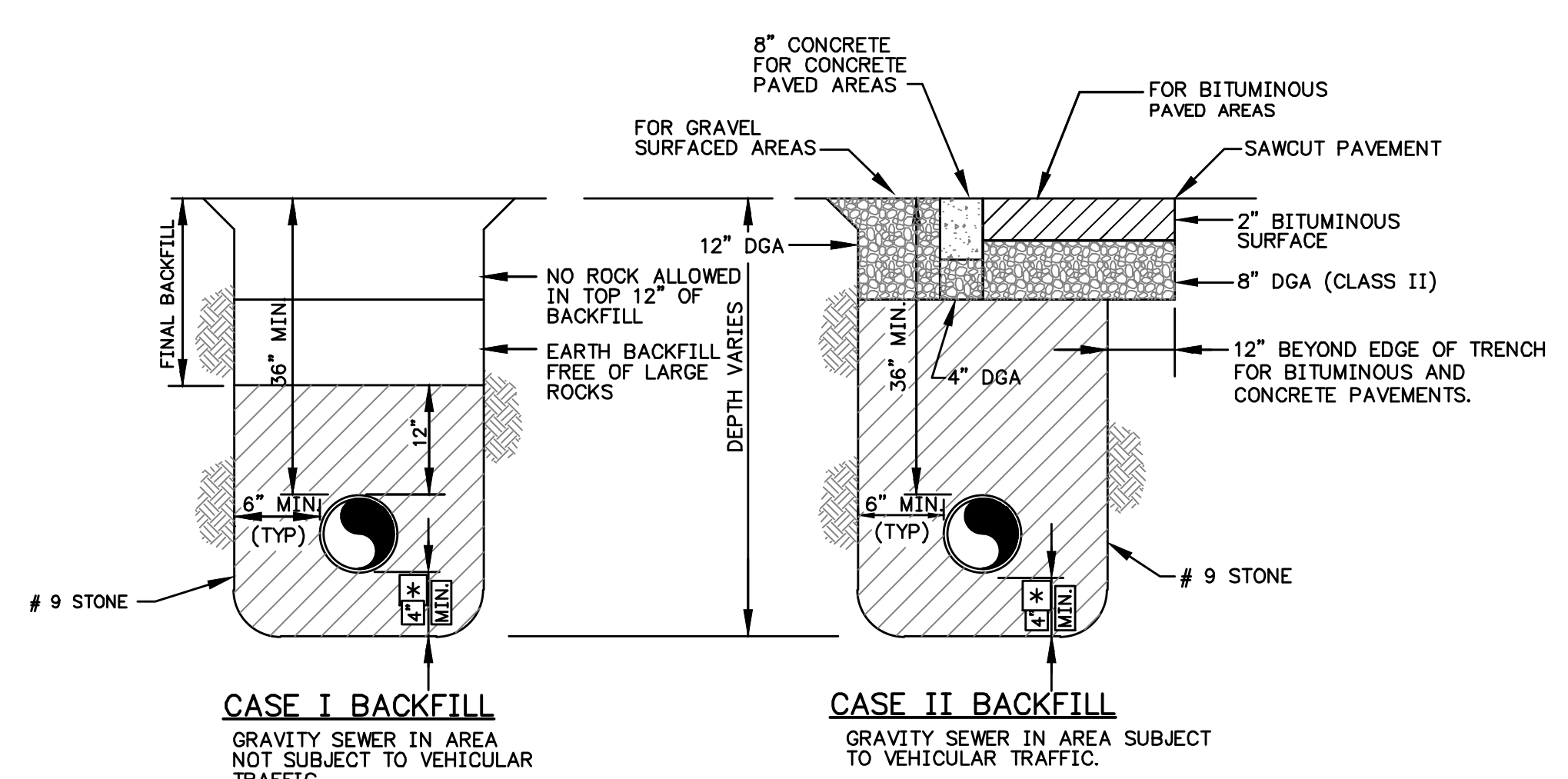
GRAVITY SEWER CREEK CROSSING DETAIL (NON-ERODIBLE BOTTOM)
N.T.S.



CLEANOUT DETAIL
N.T.S.



SEWER LATERAL DETAIL
N.T.S.



CASE I BACKFILL GRAVITY SEWER IN AREA NOT SUBJECT TO VEHICULAR TRAFFIC
CASE II BACKFILL GRAVITY SEWER IN AREA SUBJECT TO VEHICULAR TRAFFIC

- DEPTH OF BACKFILL FOR SDR 35 PVC PIPE SHALL NOT EXCEED 15 FEET.
 - TRENCHES SHALL BE SHORED, SLOPED, OR SHIELDED AS NECESSARY TO PROTECT WORKERS AND CONFORM TO OSHA REGULATIONS.
 - SEE CITY OF MADISONVILLE STANDARDS MANUAL FOR SUBGRADE REQUIREMENTS FOR SEWERS 18-INCH AND LARGER.
 - DENSE GRADED AGGREGATE (DGA) SHALL BE CLASS II AS DEFINED BY THE KENTUCKY DEPT. OF HIGHWAYS STANDARD SPECIFICATIONS.
- * 6" BEDDING DEPTH REQUIRED IF SUBGRADE IS SOLID ROCK.

GRAVITY SEWER & LATERAL LINES TRENCHING AND BACKFILLING DETAILS
N.T.S.

TESTING REQUIREMENTS

- The following tests shall be conducted on gravity sewer lines in the order listed:
 - Low pressure air test
 - Vacuum test for manholes
 - Mandrel deflection test (for PVC pipe)
- The Mandrel (go/no-go) device shall be cylindrical in shape and constructed with nine (9) evenly spaced arms of prongs. The Mandrel dimension shall be 95 percent of the flexible pipe's published ASTM average inside diameter. The Mandrel inspection shall be conducted no earlier than 30 days after installation and final trench backfill. Deflection shall not exceed 5 percent of the pipe's average inside diameter. The Mandrel shall be hand pulled by the contractor through all sewer lines. The Mandrel shall not be forced through the pipe; pipe damage could result.
- Low pressure air tests shall be conducted using equipment specifically designed and manufactured for the purpose of testing sewer lines using low pressure air. The equipment shall be provided with an air regulator valve or air safety valve so set that the internal pressure in the pipeline cannot exceed 5 psig. The test shall be made on each manhole-to-manhole section of piping after placement of the backfill. Testing shall be conducted in accordance with ASTM F1417 and Section 12.17 of the City of Madisonville Standards Manual.
- Manholes shall be vacuum tested after installation, with all connections in place, in accordance with ASTM C1244. The vacuum test shall include testing of the seal between the cast iron frame and the concrete cone, slab or grade rings. A vacuum of 10 inches of mercury shall be drawn on the manhole. The manhole shall be considered to pass the vacuum test if it holds at least 9 inches of mercury for the following time durations:

Manhole Depth	Time (Seconds)		
	4 ft. Dia.	5 ft. Dia.	6 ft. Dia.
20 feet or less	50	65	81
20.1 to 30 feet	74	98	121

If a manhole fails the vacuum test, it shall be repaired with a non-shrinkable grout or other suitable material and retested.
- The contractor must schedule acceptance testing 24 hours in advance and will be required to call the morning of the test to ensure City personnel are available to witness the test. City personnel must witness all tests.
- All tests shall be performed by the contractor. The contractor shall provide all equipment, appurtenances, and labor necessary to properly conduct the tests. The contractor is responsible for the ultimate performance of the sewer line and manholes within the above test requirements. City of Madisonville personnel will witness and record the test results.

CITY OF MADISONVILLE, KENTUCKY ENGINEERING DEPARTMENT
STANDARD DETAILS - SANITARY SEWER CONSTRUCTION



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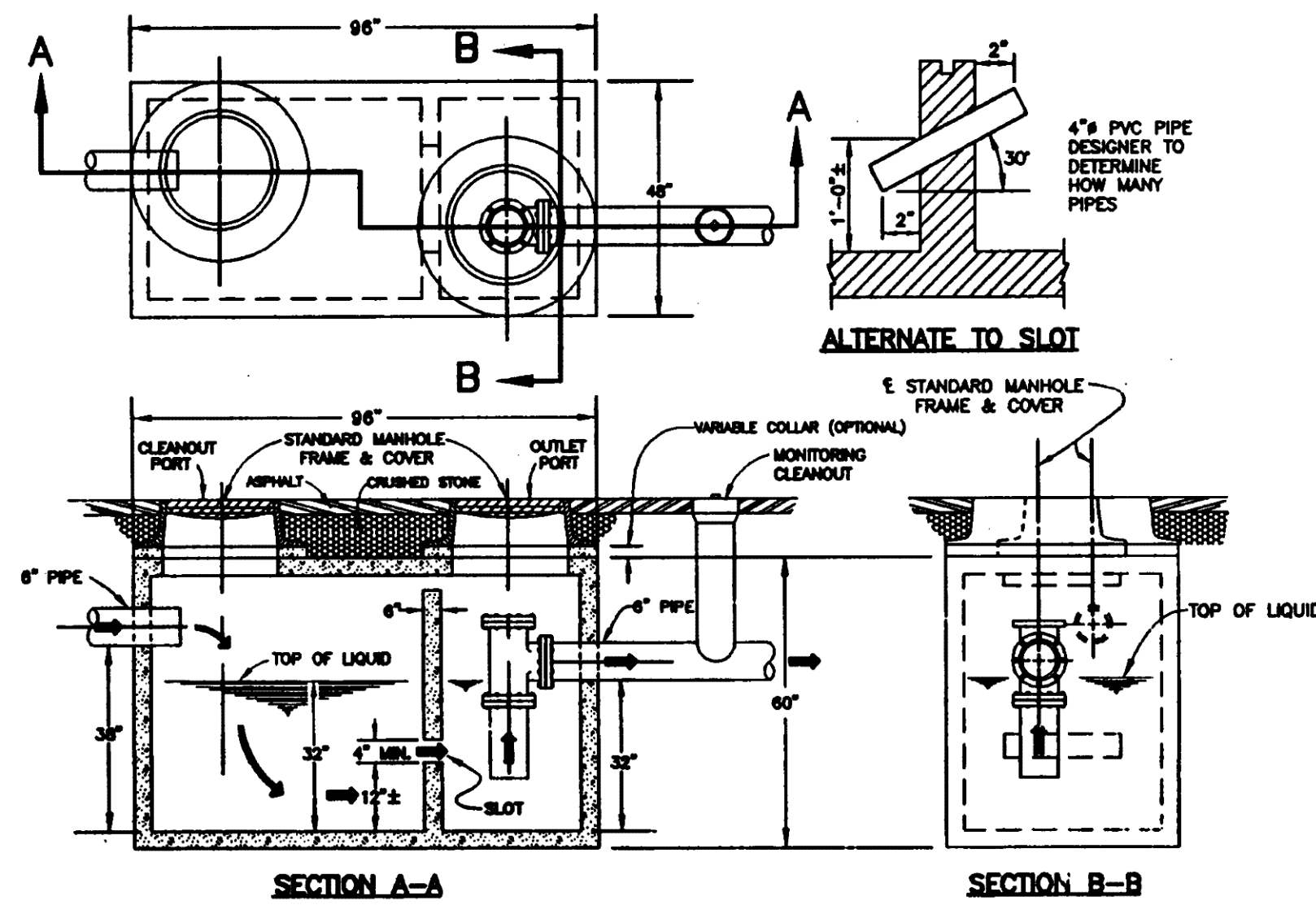
NOTES:
USE: The grease trap is to be used as a floating liquid and solid separation unit prior to allowing wastewater containing oils, greases and fats to flow into sanitary sewer. Sanitary (human) waste must not flow through the grease trap. Garbage grinders (disposals) should not be on a connection upstream of a grease trap.

LOCATION: The final end of the trap should be located a distance not more than five (5) feet from the outer perimeter of the structure at a point nearest the area where the separate kitchen line emerges from the building. The effluent line is to be connected to the public sewer. In addition, the tank must be located in a position accessible to vault-cleaning trucks. Both cleanout and outlet ports must be fitted with a standard traffic manhole and frame, and cover.

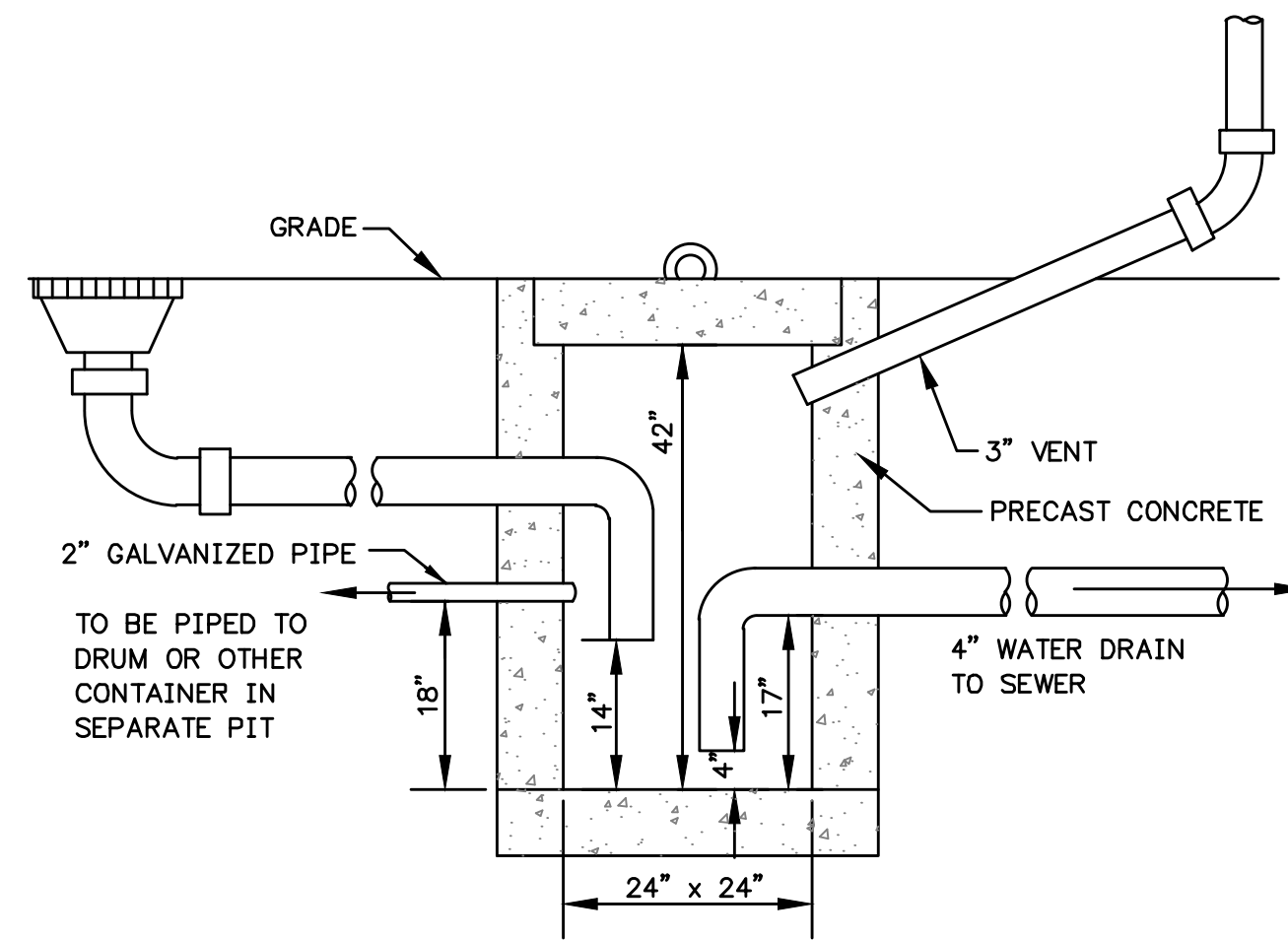
CONSTRUCTION: Cast iron, PVC or polyethylene piping shall be used for the influent to the grease trap. The effluent pipe to the public sewer may be cast iron, vitrified clay or other materials meeting the local and state plumbing code. The joints shall be of watertight construction. Joints in vitrified clay pipe shall be precast to conform to ASTM SPECIFICATIONS C-425. Joints to outside of trap may be flexible material.

DESIGN AND SIZING:
 1. Items to consider in the design of a grease trap are:
 A. Accessibility of the trap to assure convenience in cleaning and removal of accumulated grease.
 B. The distance between inlet pipe and outlet pipe shall be maximized so that adequate separation of grease and wastewater occurs, and short-circuiting is minimized.
 C. Venting is not necessary for units that have piping of sufficient size such that siphonage of the outlet pipe is unlikely.
 D. Monitoring cleanout required on discharge pipe.
 2. **REQUIREMENT:** The plan shown hereon represents one concept only of a trap of 1000 gallon capacity of liquid when in operation.

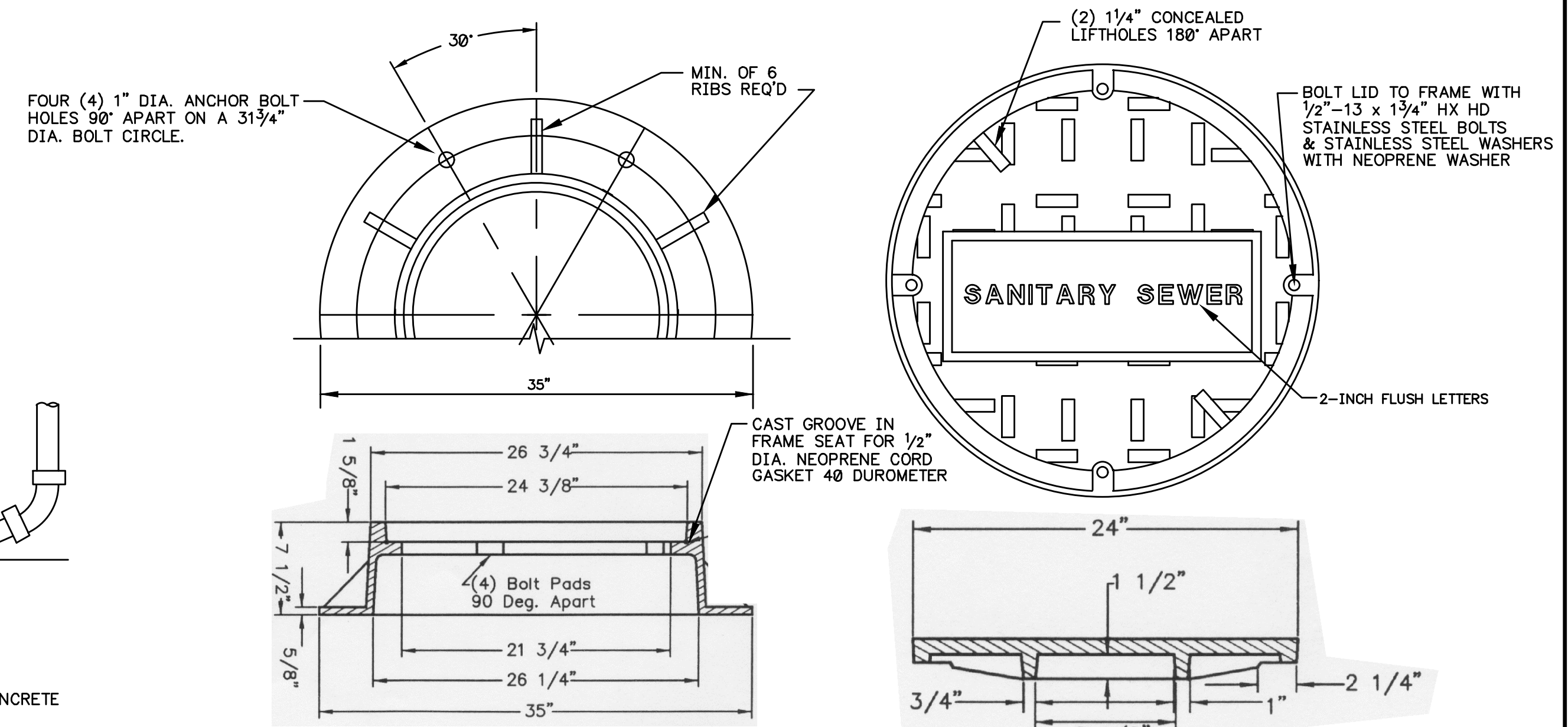
STRUCTURAL DESIGN: It is the responsibility of the applicant to provide structural design (concrete thickness and composition with appropriate reinforcing steel) to meet the anticipated live and dead loads.



1000 GALLON GREASE TRAP
 N.T.S.



OIL AND WATER SEPARATOR
 N.T.S.

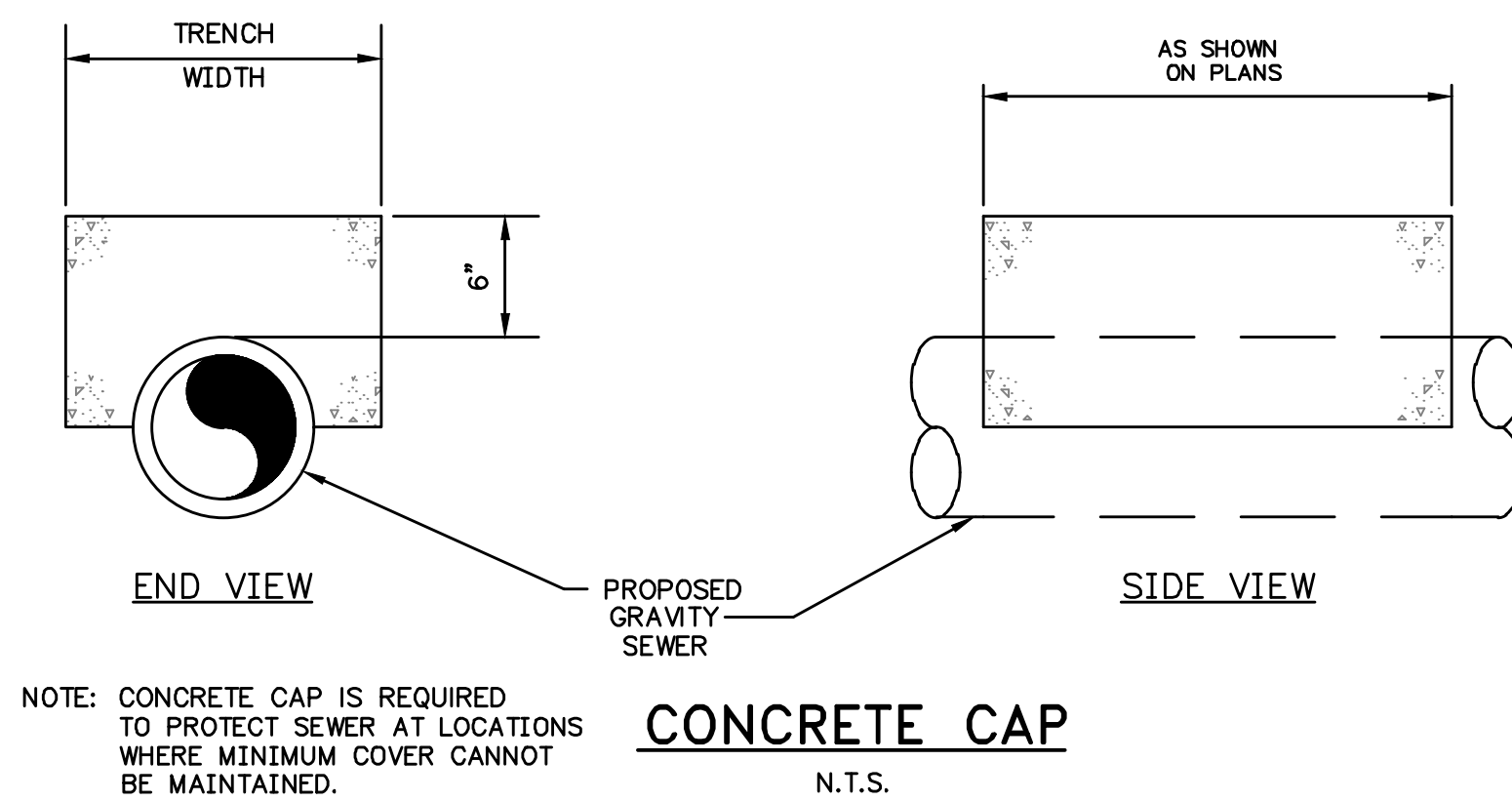


FRAME

COVER

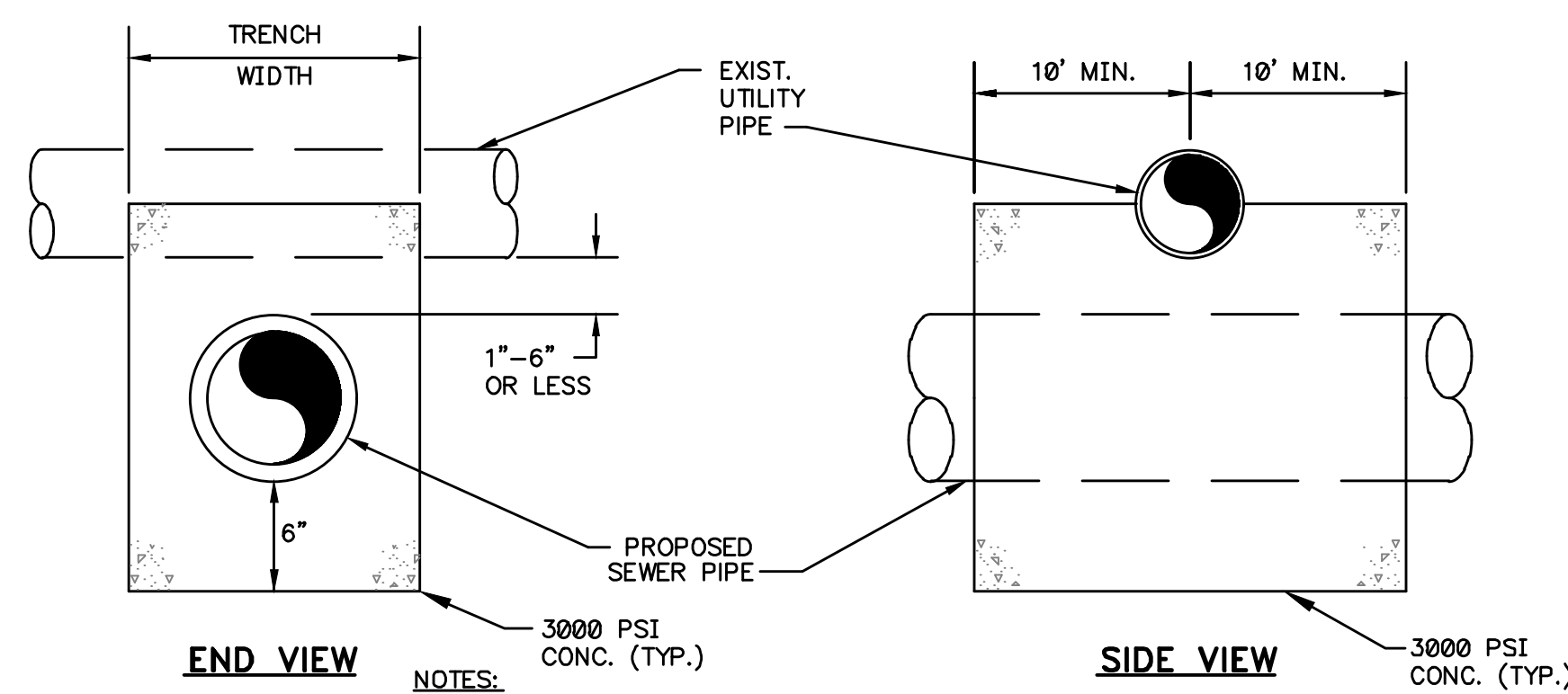
NOTES:
 1. MATERIAL: CAST GRAY IRON ASTM A-48 CLASS 35B.
 2. DESIGN FOR H25 LOADING.
 3. MINIMUM WEIGHTS: FRAME 200 LBS., LID 134 LBS.
 4. NEENAH R-1916-D, HOE-345 WT. OR APPROVED EQUAL.

WATERTIGHT MANHOLE FRAME AND COVER
 N.T.S.



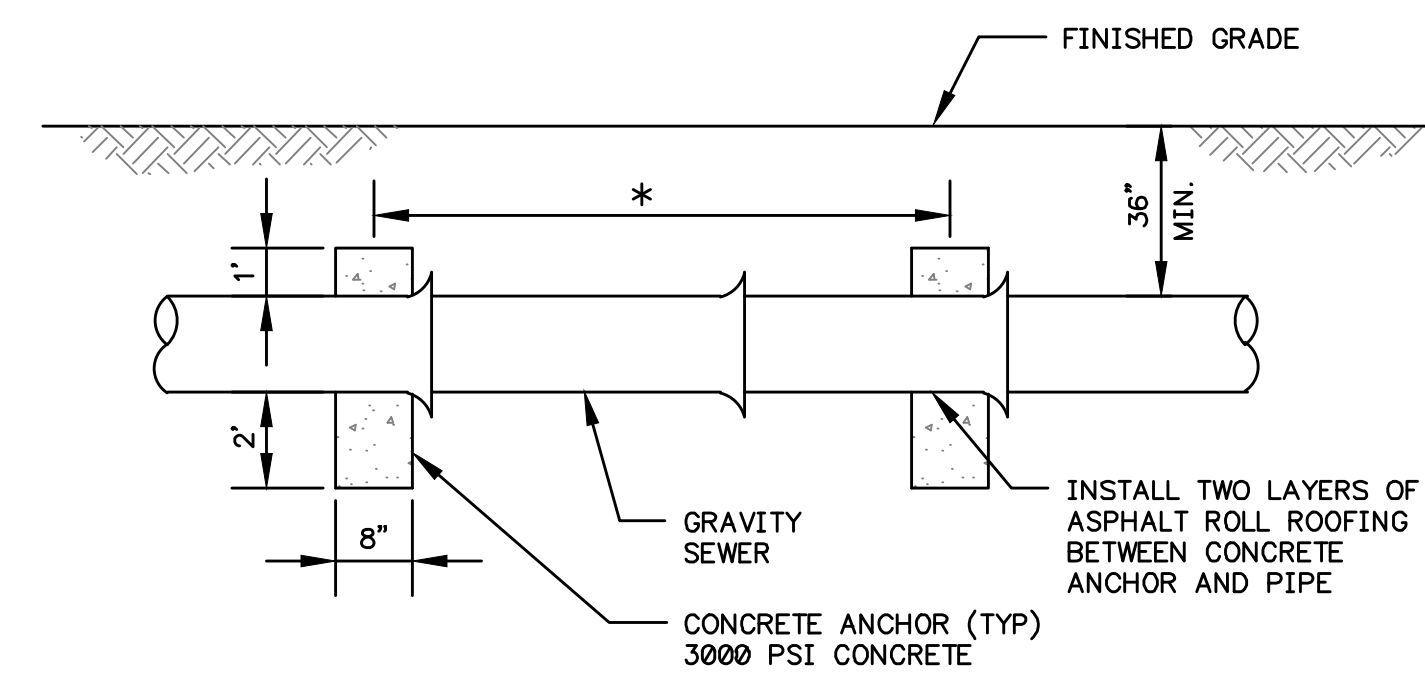
NOTE: CONCRETE CAP IS REQUIRED TO PROTECT SEWER AT LOCATIONS WHERE MINIMUM COVER CANNOT BE MAINTAINED.

CONCRETE CAP
 N.T.S.



NOTES:
 1. CONCRETE ENCASEMENT SHALL BE USED WHEN CLEARANCE BETWEEN SEWER AND UTILITY PIPE IS 1'-6" OR LESS. CONCRETE SHALL BE CLASS "A" MEETING THE REQUIREMENTS OF SECTION 601 OF THE KDOH "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION", CURRENT EDITION.
 2. "UTILITY PIPE" INCLUDES UNDERGROUND WATER, NATURAL GAS, TELEPHONE, ELECTRICAL CONDUITS, STORM SEWER OR TYPICALLY NON-CONTAMINATING FACILITIES.
 3. PROPOSED SEWER TO BE FULLY ENCASED WHETHER ABOVE OR BELOW EXISTING UTILITY PIPE. IF ABOVE EXISTING UTILITY PIPE, PROTECT UTILITY PIPE WITH PIPE SADDLE BEFORE PLACING CONCRETE.

UTILITY CROSSING CONCRETE ENCASUREMENT
 N.T.S.



NOTES:
 1. SEE BEDDING & BACKFILLING DETAILS (DWG. 5) FOR TRENCH WIDTH. CONCRETE TO EXTEND FULL WIDTH OF TRENCH.
 2. CONCRETE FOR ANCHORS SHALL BE CLASS "A" MEETING THE REQUIREMENTS OF SECTION 601 OF THE KDOH "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION", CURRENT EDITION.
 3. CONCRETE ANCHORS ARE REQ'D FOR GRADES OF 20% OR MORE
 *SPACING AS FOLLOWS:
 ≤36 FT. ON GRADES BETWEEN 20-35%
 ≤24 FT. ON GRADES BETWEEN 35-50%
 ≤16 FT. ON GRADES ≥ 50%

CONCRETE ANCHOR DETAIL
 N.T.S.



SCALE: AS NOTED
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 Q/C:

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OF 3