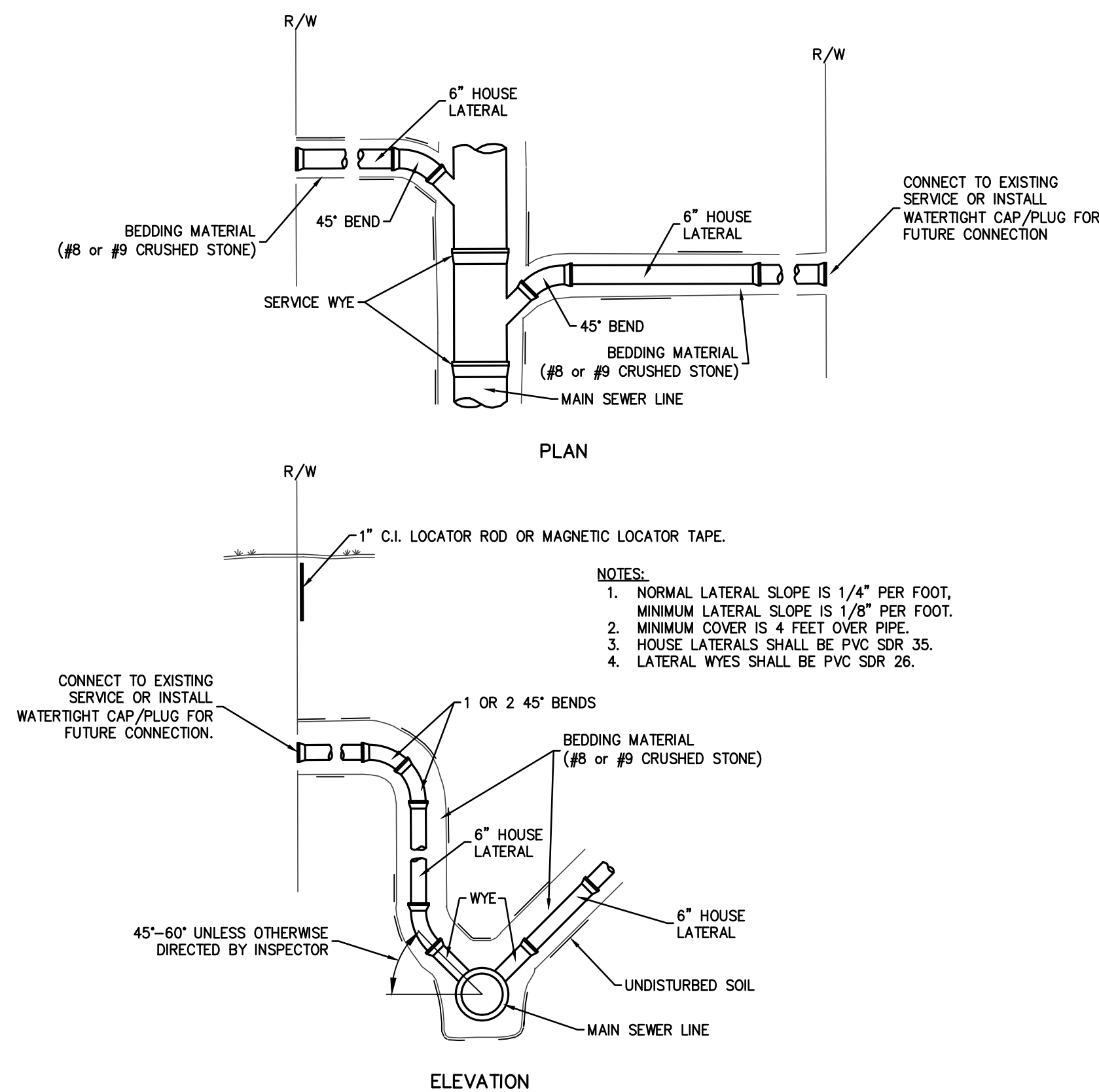
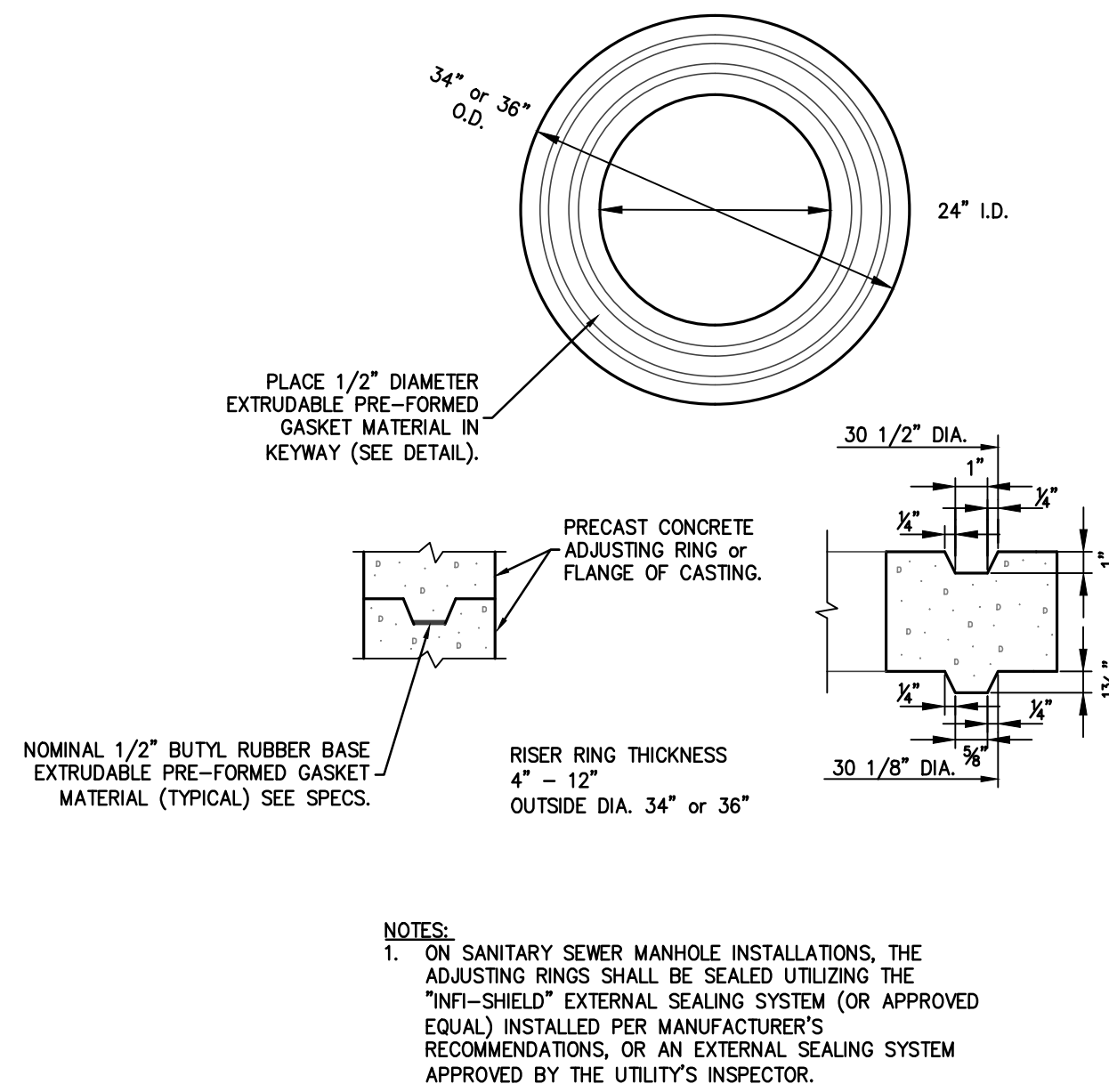


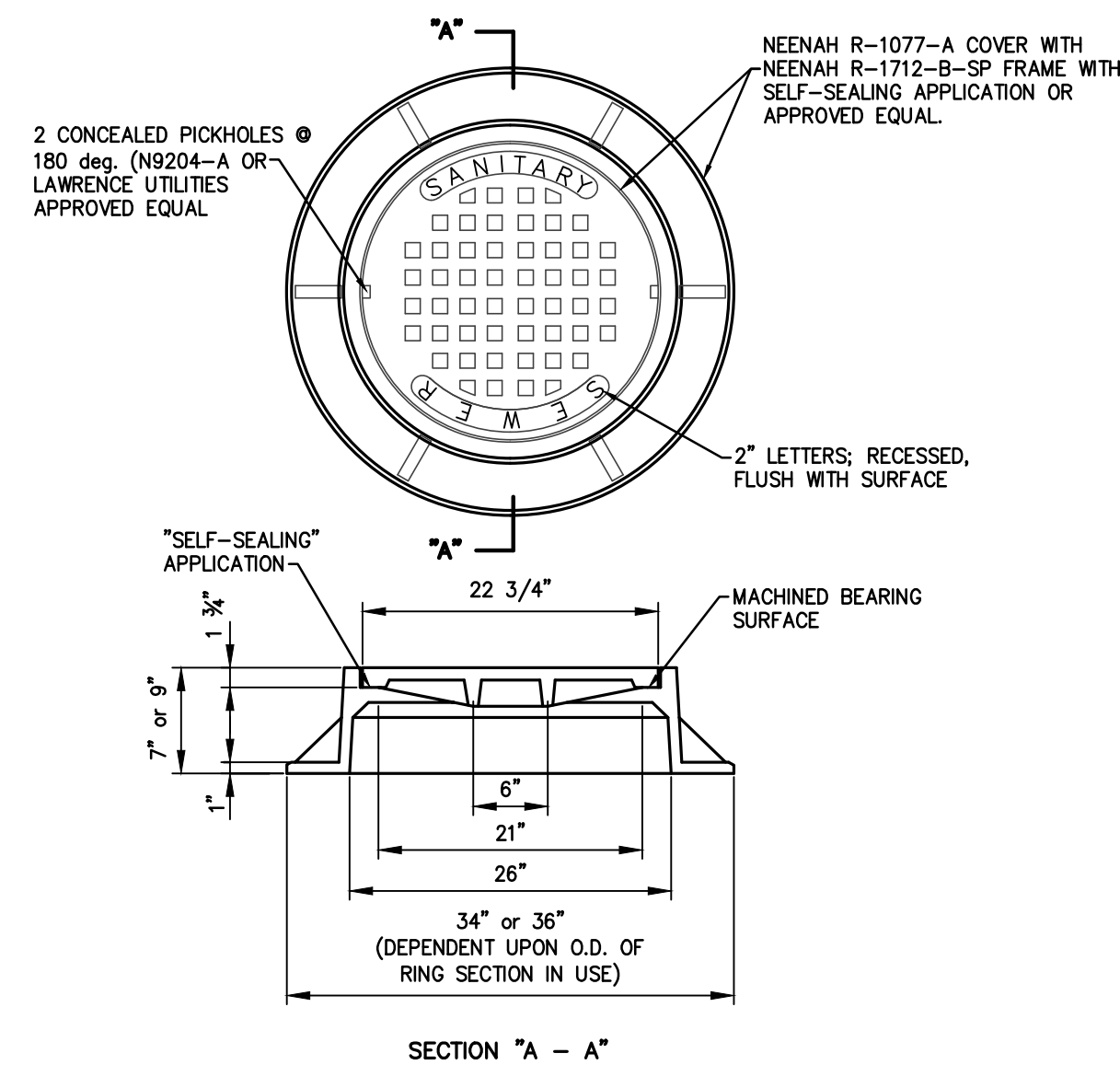
SANITARY SEWER SERVICE > 15' DEEP  
(NO SCALE)



SANITARY SEWER SERVICE < 15' DEEP  
(NO SCALE)

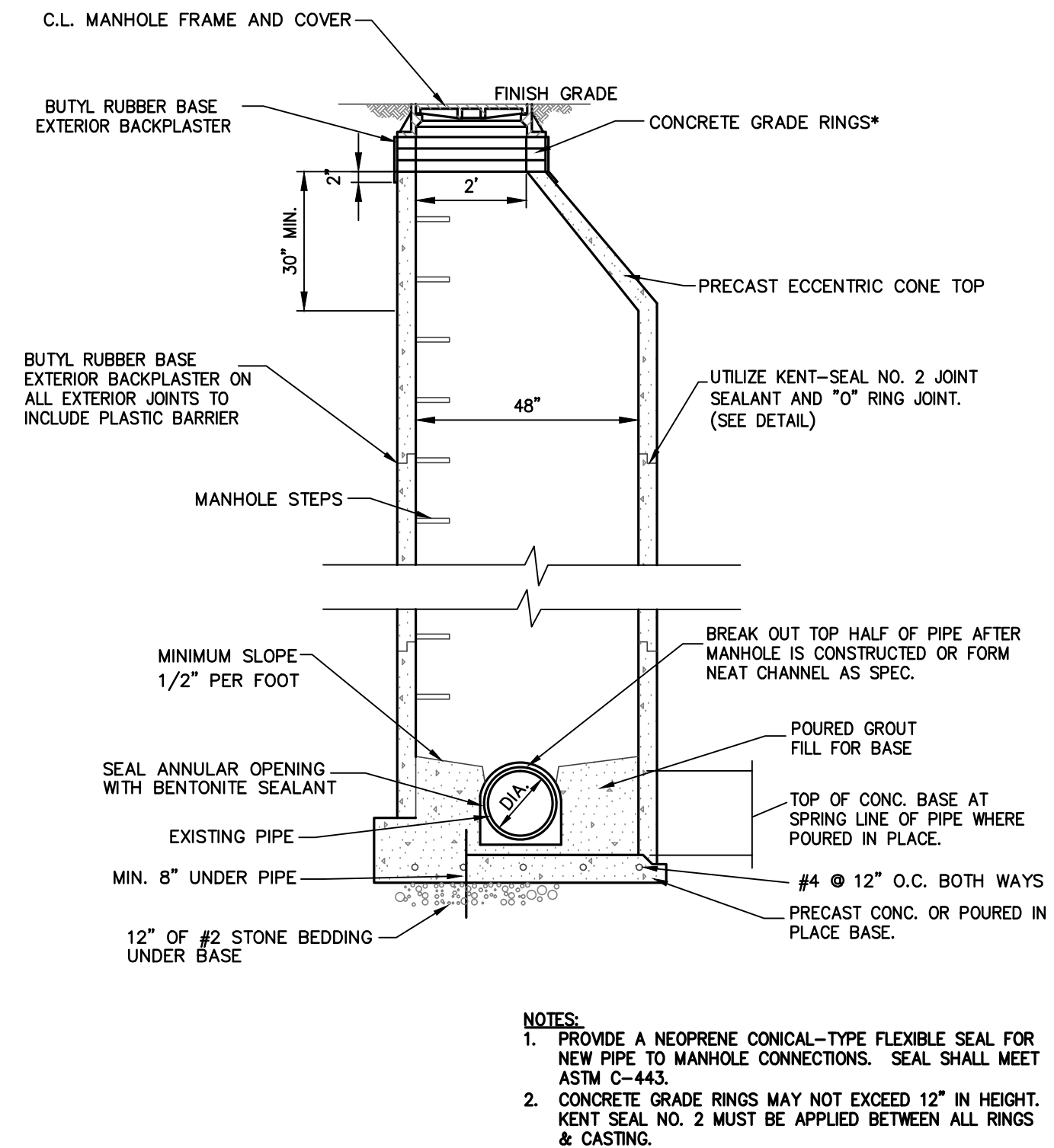


CONCRETE ADJUSTING RING  
(NO SCALE)



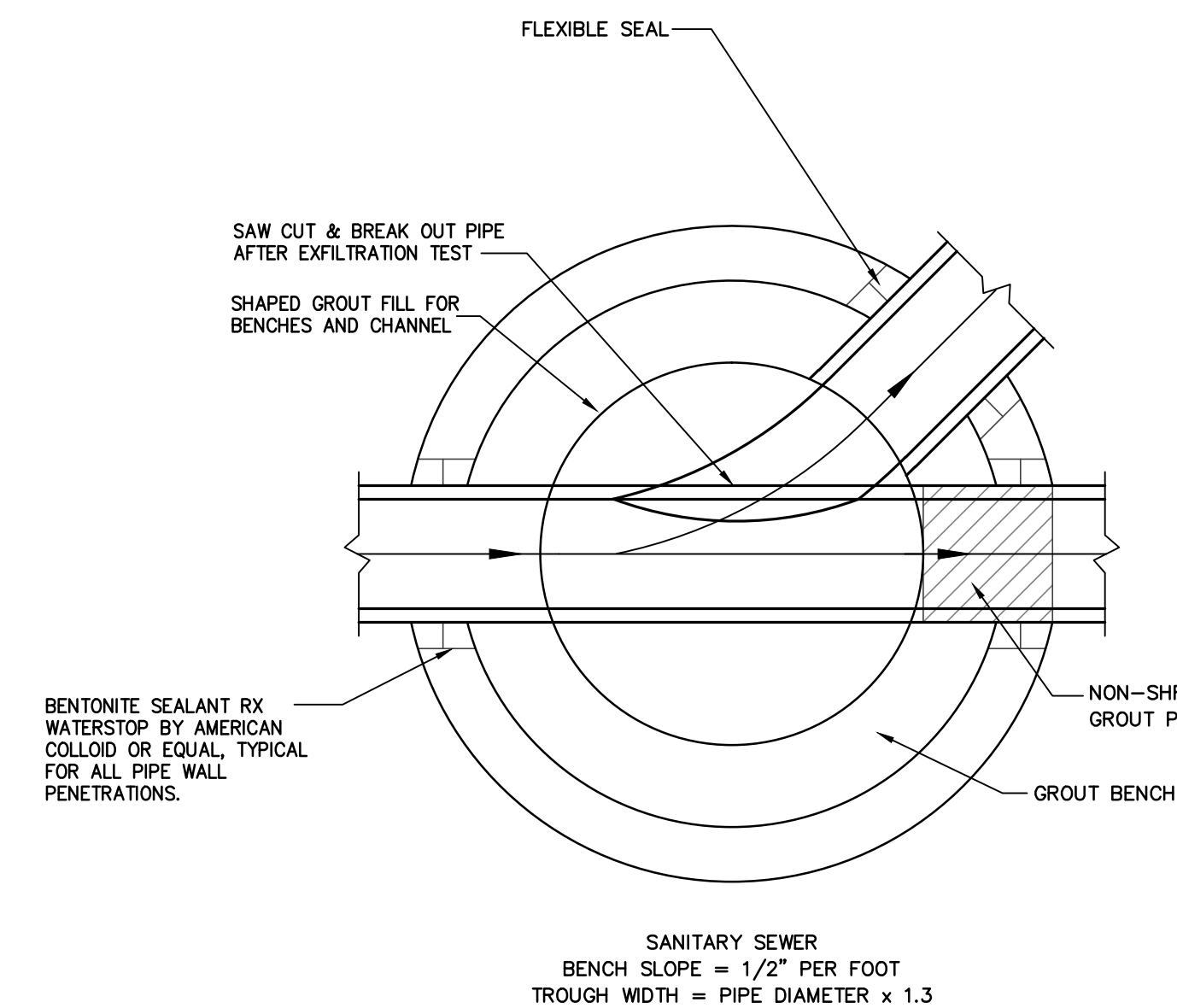
SANITARY MANHOLE FRAME & COVER  
(NO SCALE)

- NOTES:
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- NOTES:
- PROVIDE A NEOPRENE CONICAL-TYPE FLEXIBLE SEAL FOR NEW PIPE TO MANHOLE CONNECTIONS. SEAL SHALL MEET ASTM C-443.
  - CONCRETE GRADE RINGS MAY NOT EXCEED 12\"/>

NEW MANHOLE OVER EXISTING SEWER  
(NO SCALE)

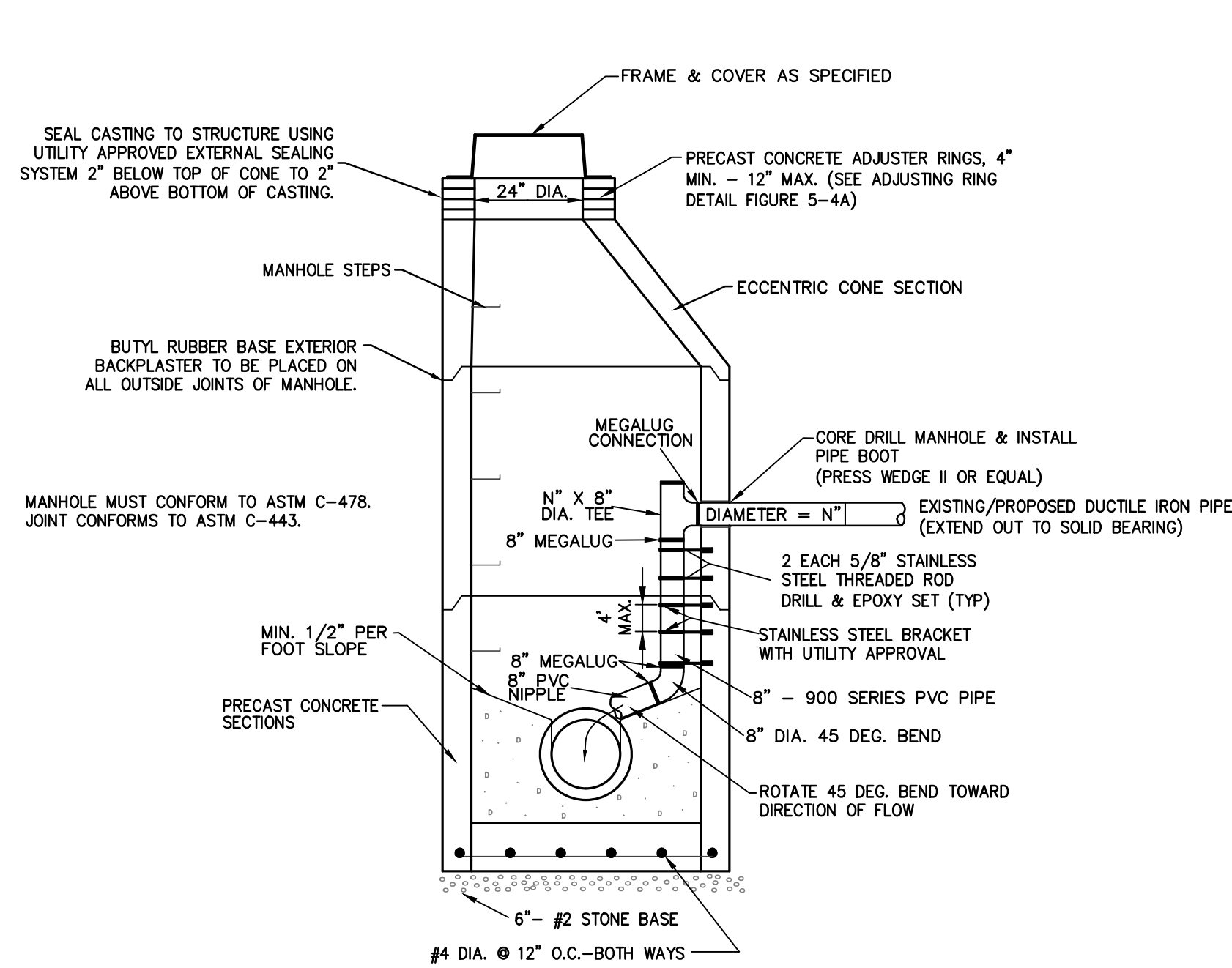


MANHOLE BENCH  
NEW MANHOLE OVER EXISTING SEWER  
(NO SCALE)

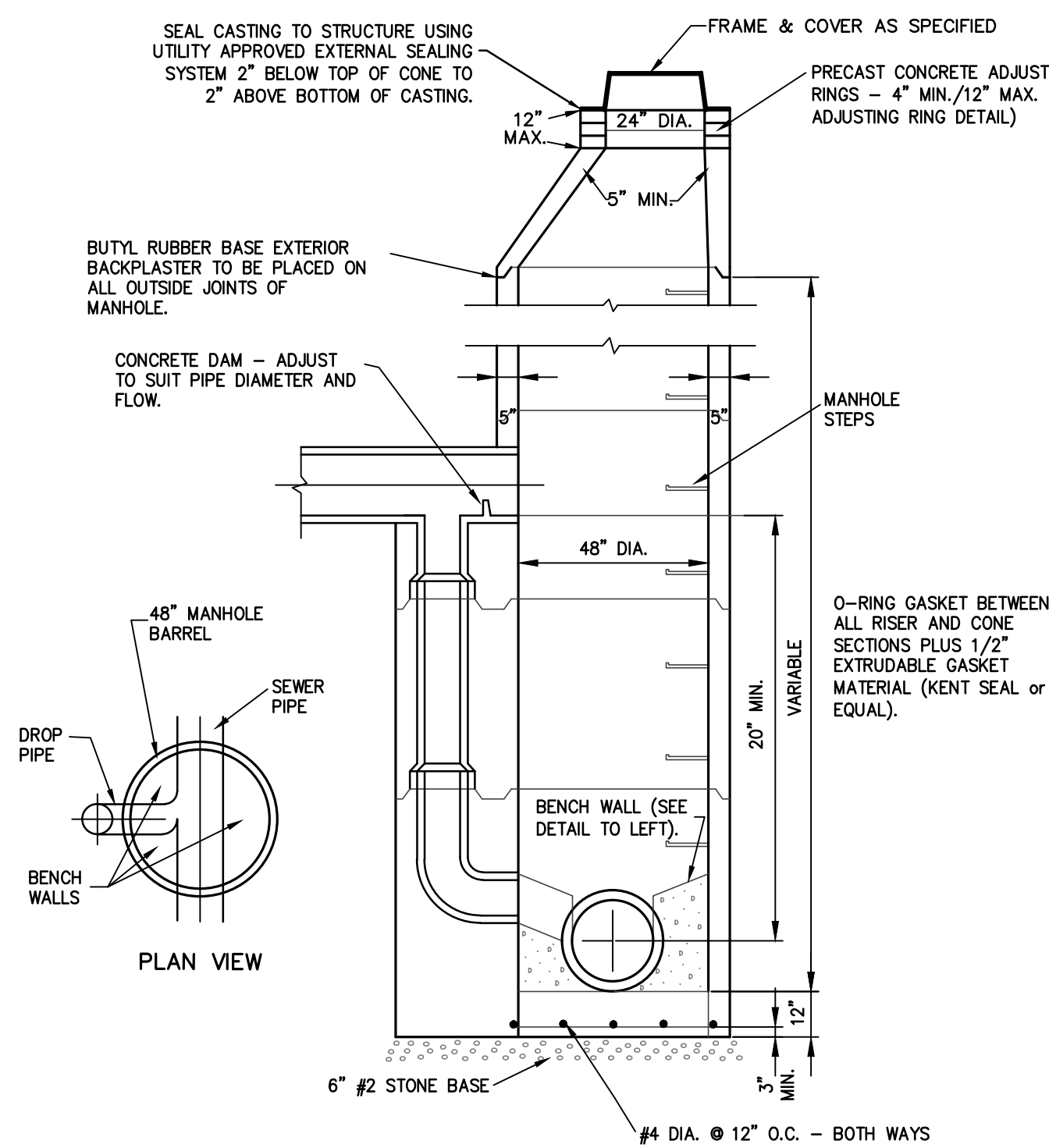
SANITARY SEWER DETAILS	
CITY OF LAWRENCE UTILITIES	
9201 HARRISON PARK CT., LAWRENCE, INDIANA 46216	
RECOMMENDED BY: _____	DATE: _____
APPROVED BY: _____	DATE: _____
REV. 12/30/2010	

SHEET

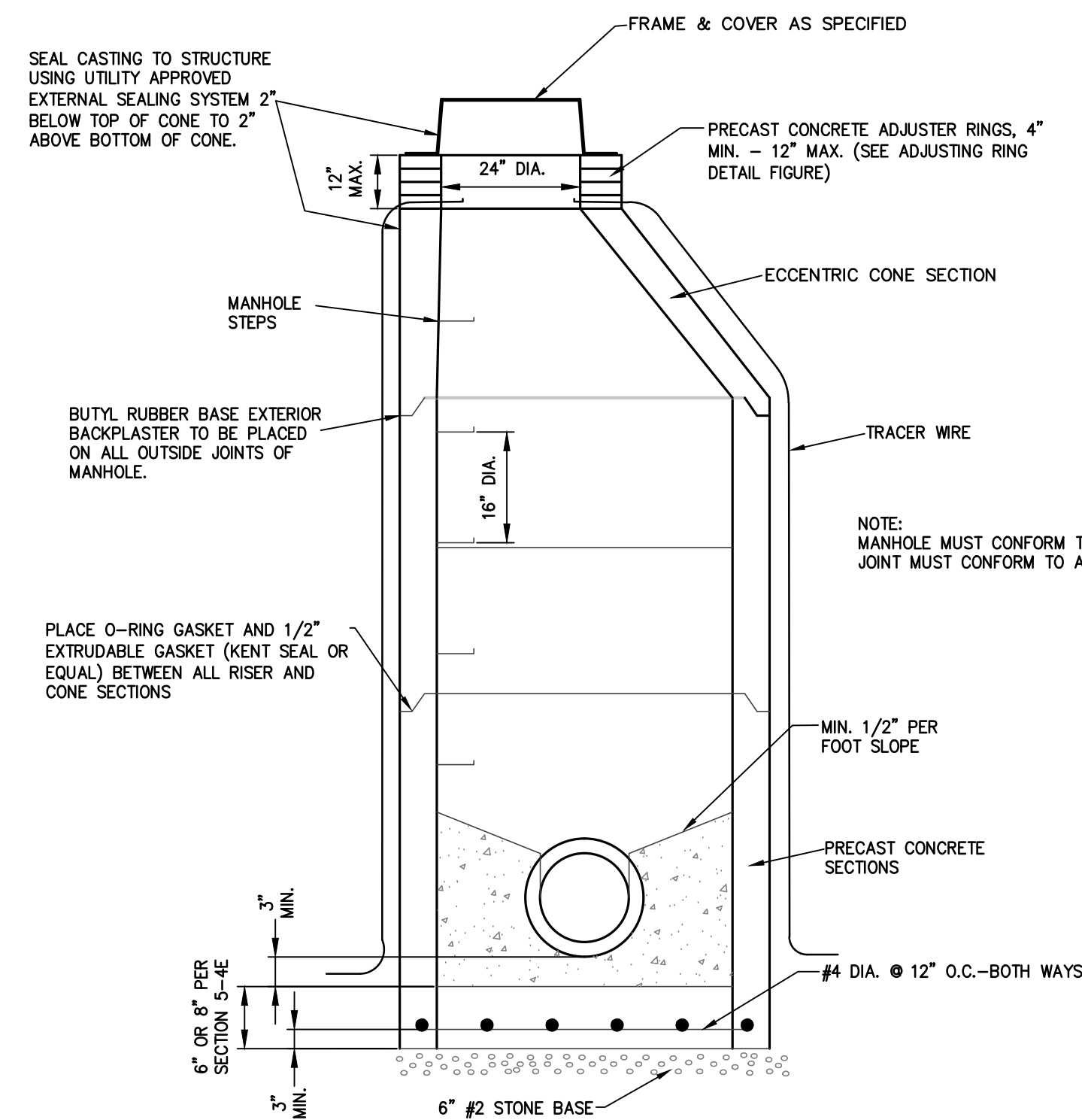
1 OF 7



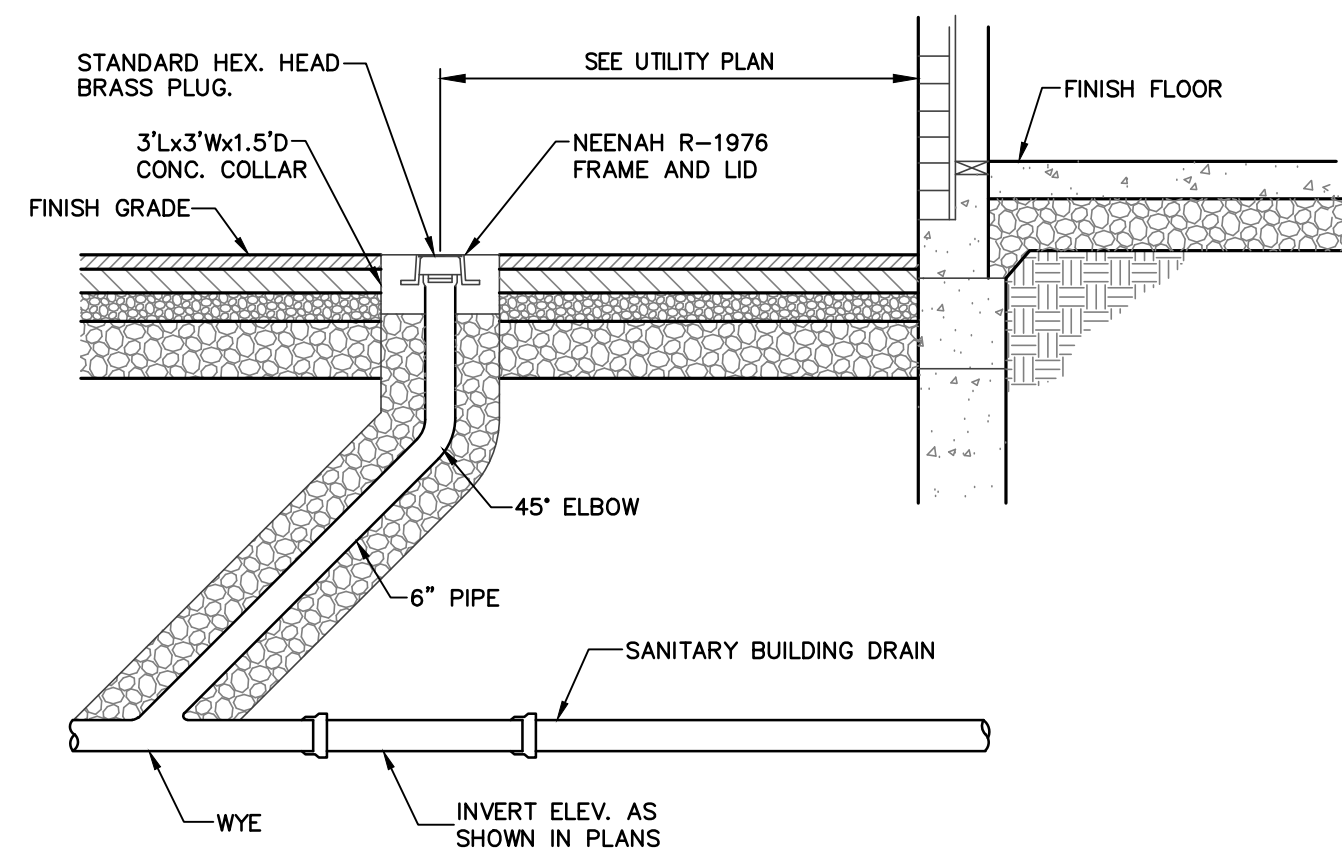
INSIDE DROP MANHOLE  
(NO SCALE)



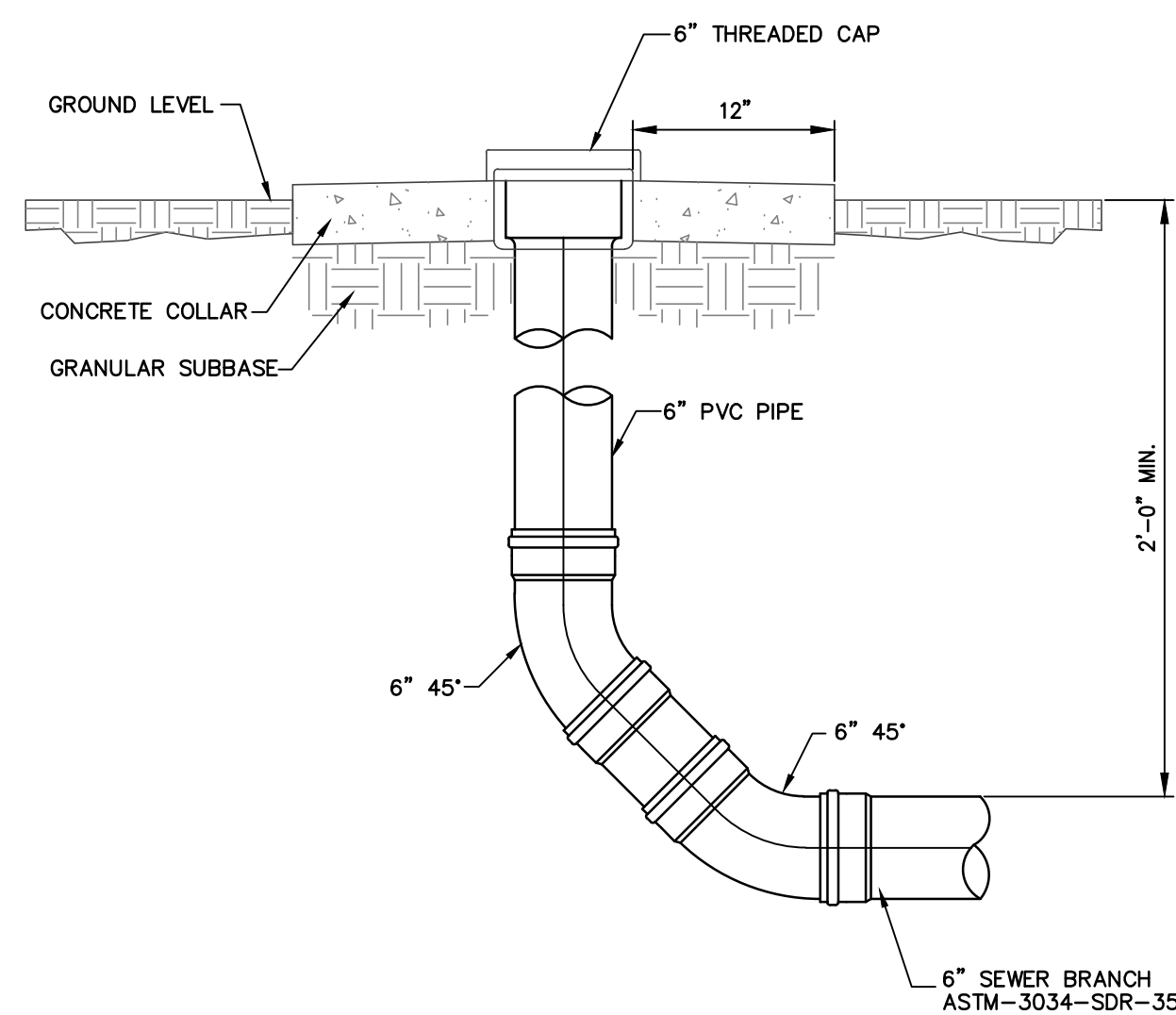
OUTSIDE DROP MANHOLE  
(NO SCALE)



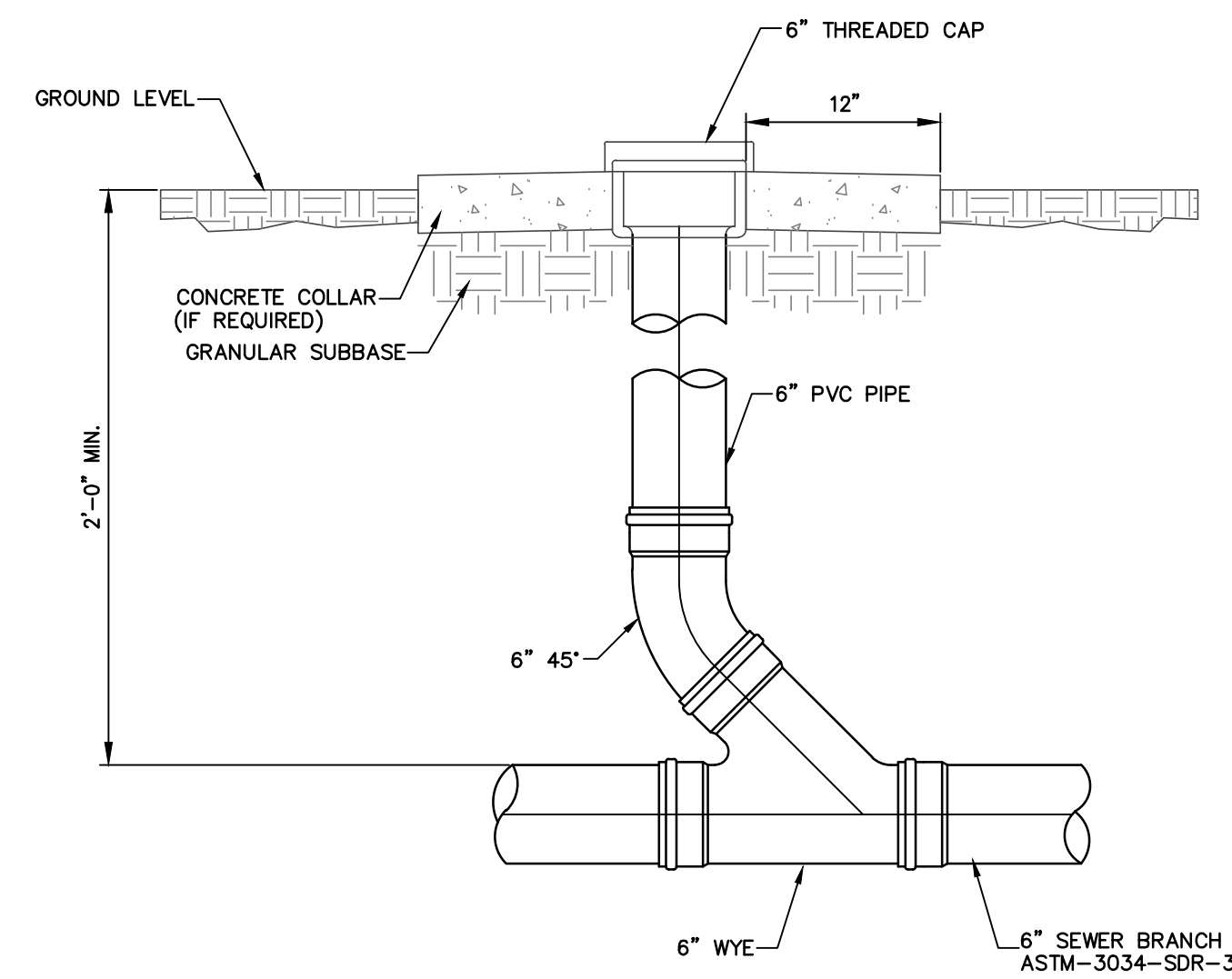
STANDARD MANHOLE (8"-24" PIPE)  
(NO SCALE)



CLEANOUT IN PAVEMENT  
(NO SCALE)



CLEANOUT AT END OF LINE  
(NO SCALE)



TYPICAL CLEANOUT  
(NO SCALE)

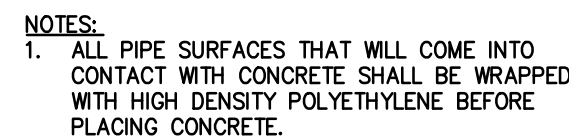
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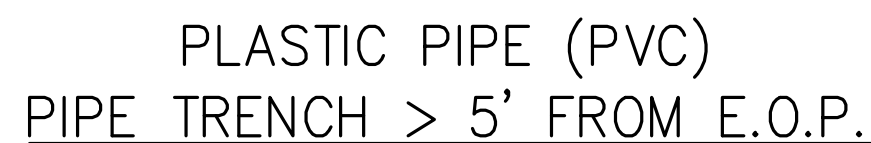
SANITARY SEWER DETAILS	
CITY OF LAWRENCE UTILITIES	
9201 HARRISON PARK CT., LAWRENCE, INDIANA 46216	
RECOMMENDED BY: _____	DATE: _____
APPROVED BY: _____	DATE: _____
REV. 12/30/2010	

SHEET

2 OF 7



(NO SCALE)



(NO SCALE)



WHILE NO GENERAL STATEMENT CAN BE MADE TO COVER ALL CONDITIONS, IT IS GENERALLY RECOGNIZED THAT SEWERS SHALL MEET THE REQUIREMENTS OF THE APPROPRIATE REVIEWING AGENCY WITH RESPECT TO MINIMUM DISTANCES FROM PUBLIC WATER SUPPLY WELLS OR OTHER WATER SUPPLY SOURCES AND STRUCTURES.

### 29.3 RELATION TO WATER MAINS

### 29.31 HORIZONTAL SEPARATION

SEWERS SHALL BE LAID AT LEAST 10 FEET (3.0 M) HORIZONTALLY FROM ANY EXISTING OR PROPOSED WATER MAIN. THE DISTANCE SHALL BE MEASURED EDGE TO EDGE. IN CASES WHERE IT IS NOT PRACTICAL TO MAINTAIN A 10 FOOT SEPARATION, THE APPROPRIATE REVIEWING AGENCY MAY ALLOW DEVIATION ON A CASE-BY-CASE BASIS, IF SUPPORTED BY DATA FROM THE DESIGN ENGINEER.

### 29.32 CROSSINGS SEWERS CROSSING

WATER MAINS SHALL BE LINED TO PROVIDE A MINIMUM VERTICAL DISTANCE OF 18 INCHES (46 CM) BETWEEN THE OUTSIDE OF THE WATER MAIN AND THE OUTSIDE OF THE SEWER. THIS SHALL BE THE CASE WHERE THE WATER MAIN IS EITHER ABOVE OR BELOW THE SEWER. THE CROSSING SHALL BE ARRANGED SO THAT THE SEWER JOINTS WILL BE EQUIDISTANT AND AS FAR AS POSSIBLE FROM THE WATER MAIN JOINTS. WHERE A WATER MAIN CROSSES UNDER A SEWER, ADEQUATE STRUCTURAL SUPPORT SHALL BE PROVIDED FOR THE SEWER TO PREVENT DAMAGE TO THE WATER MAIN.

### 29.33 SPECIAL CONDITIONS

WHEN IT IS IMPOSSIBLE TO OBTAIN PROPER HORIZONTAL AND VERTICAL SEPARATION AS STIPULATED ABOVE, CONTRACTOR TO ASSURE WATERTIGHTNESS PRIOR TO BACKFILLING. WORK MUST BE INSPECTED BY LAWRENCE UTILITIES INSPECTORS.



(NO SCALE)



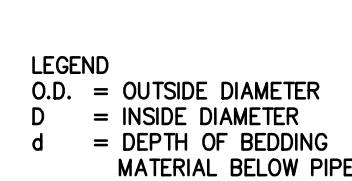
(NO SCALE)

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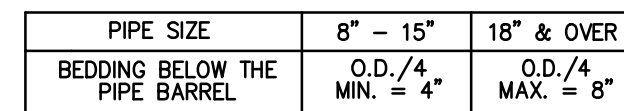


(NO SCALE)



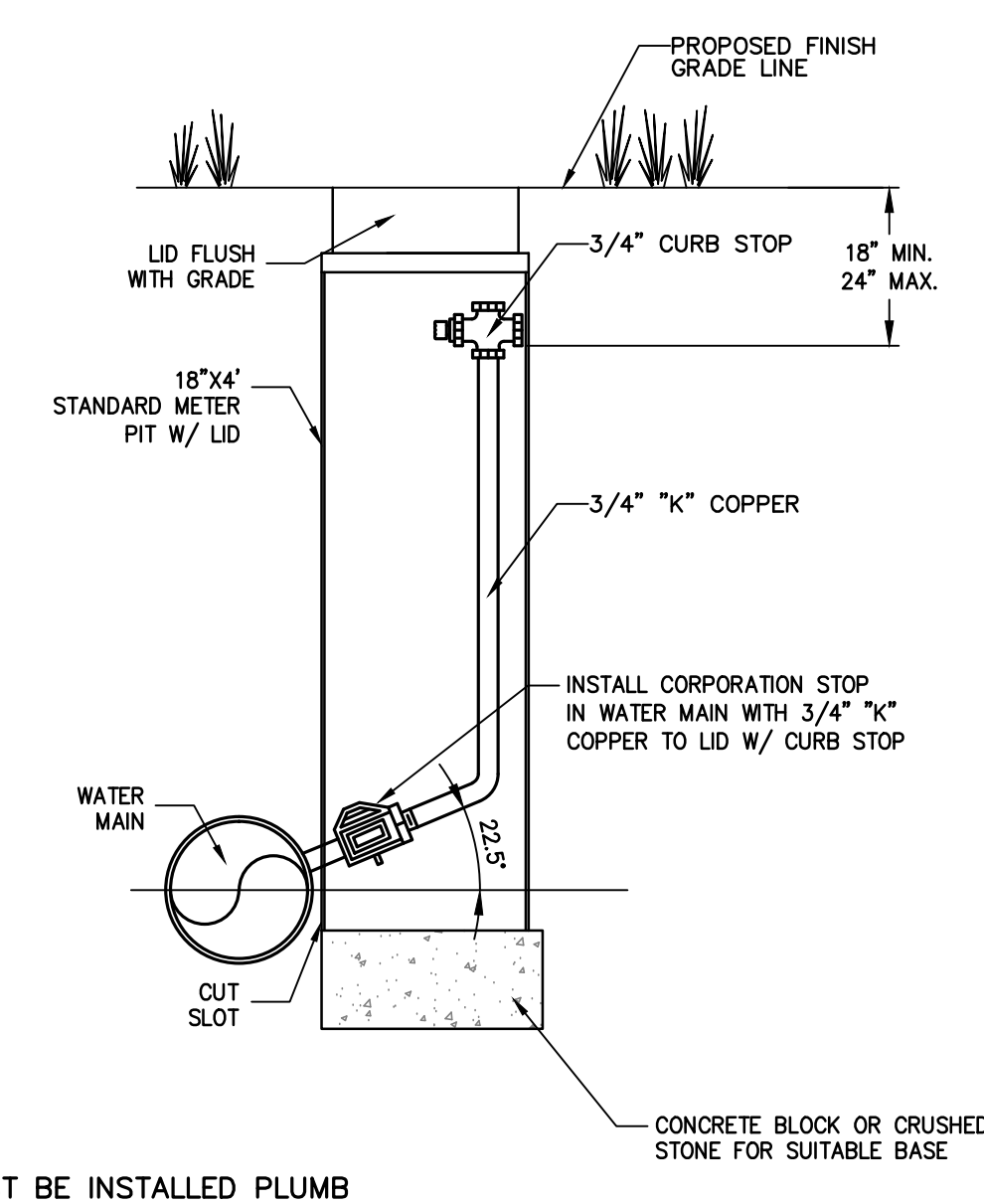
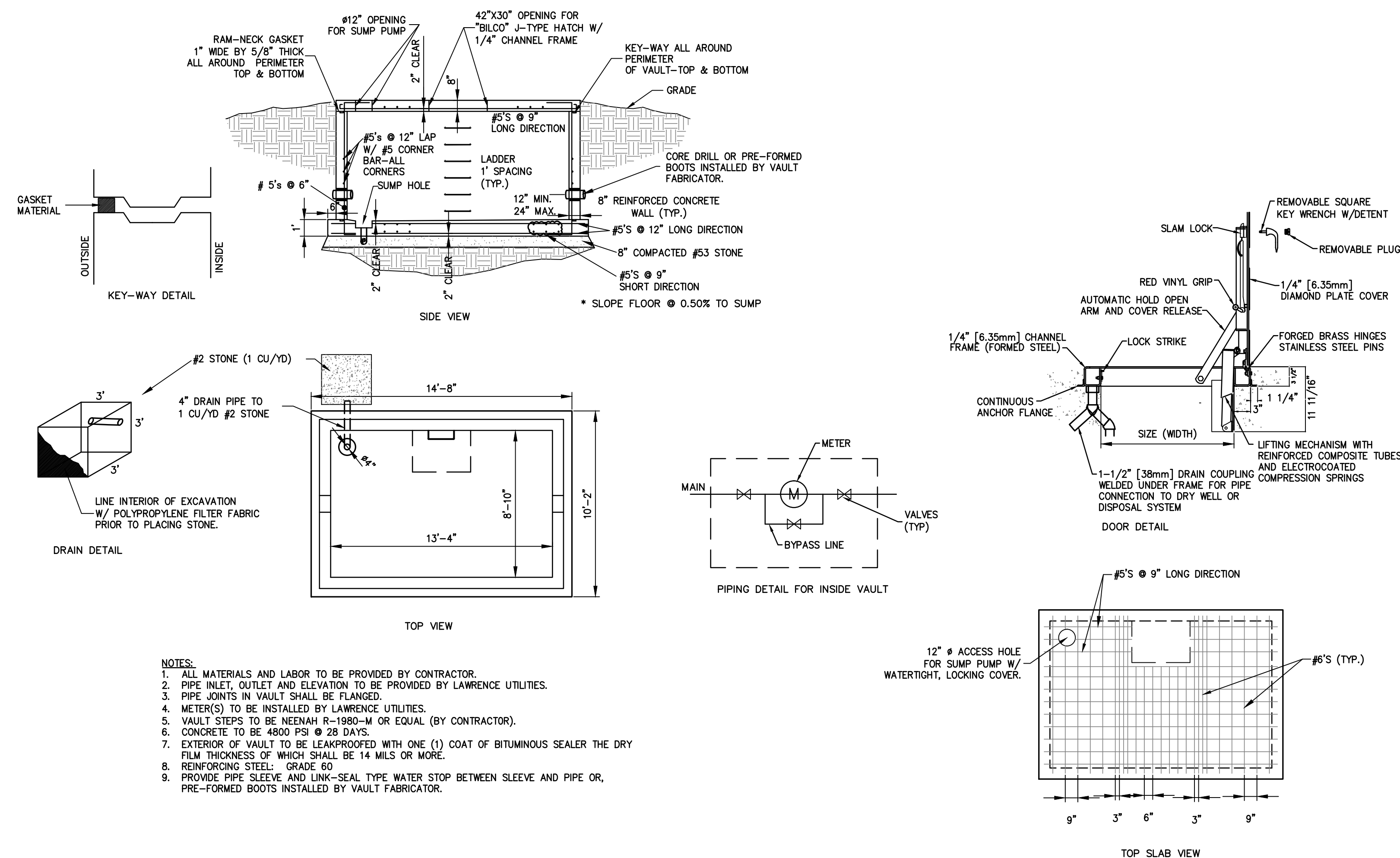
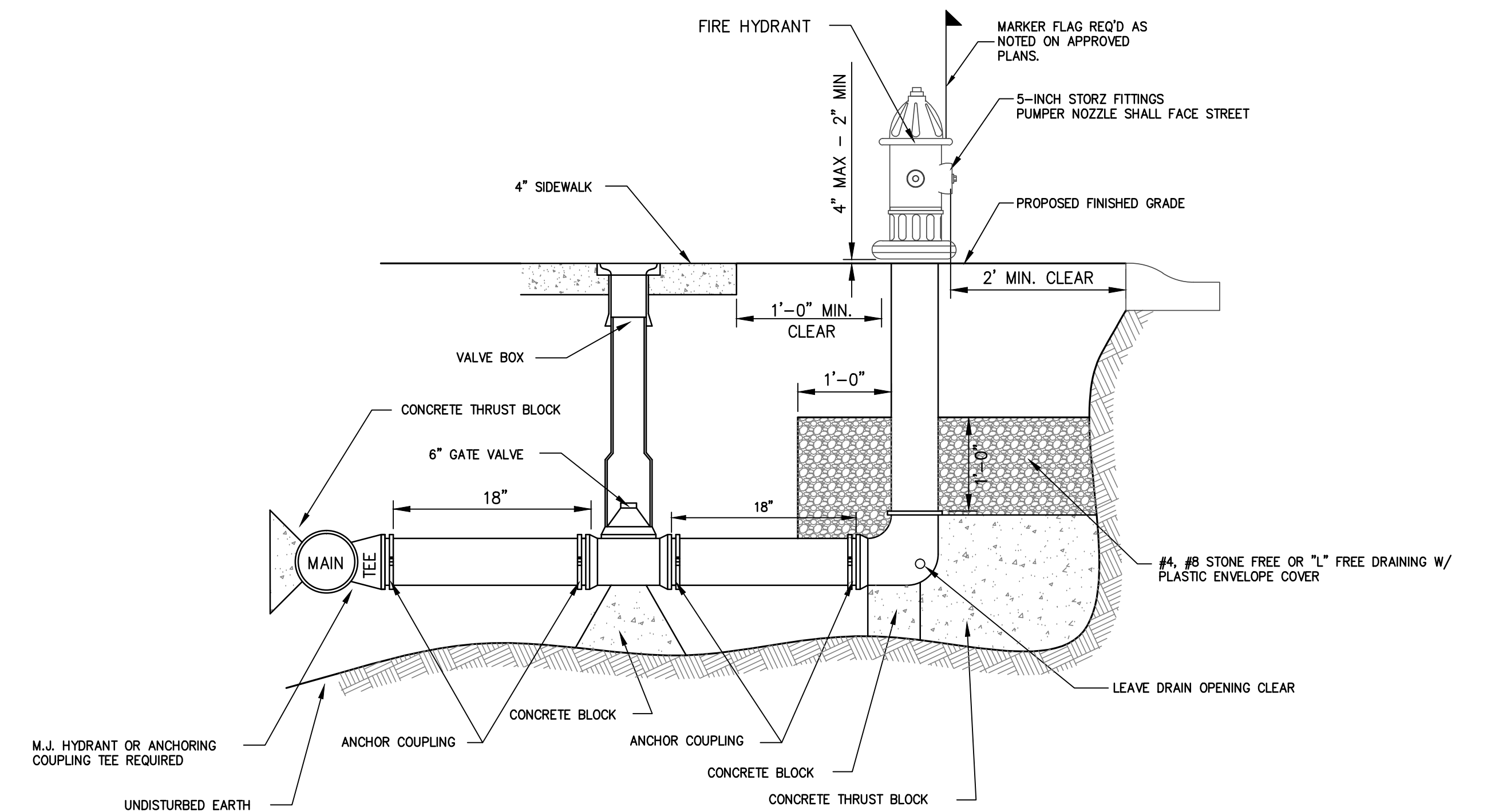
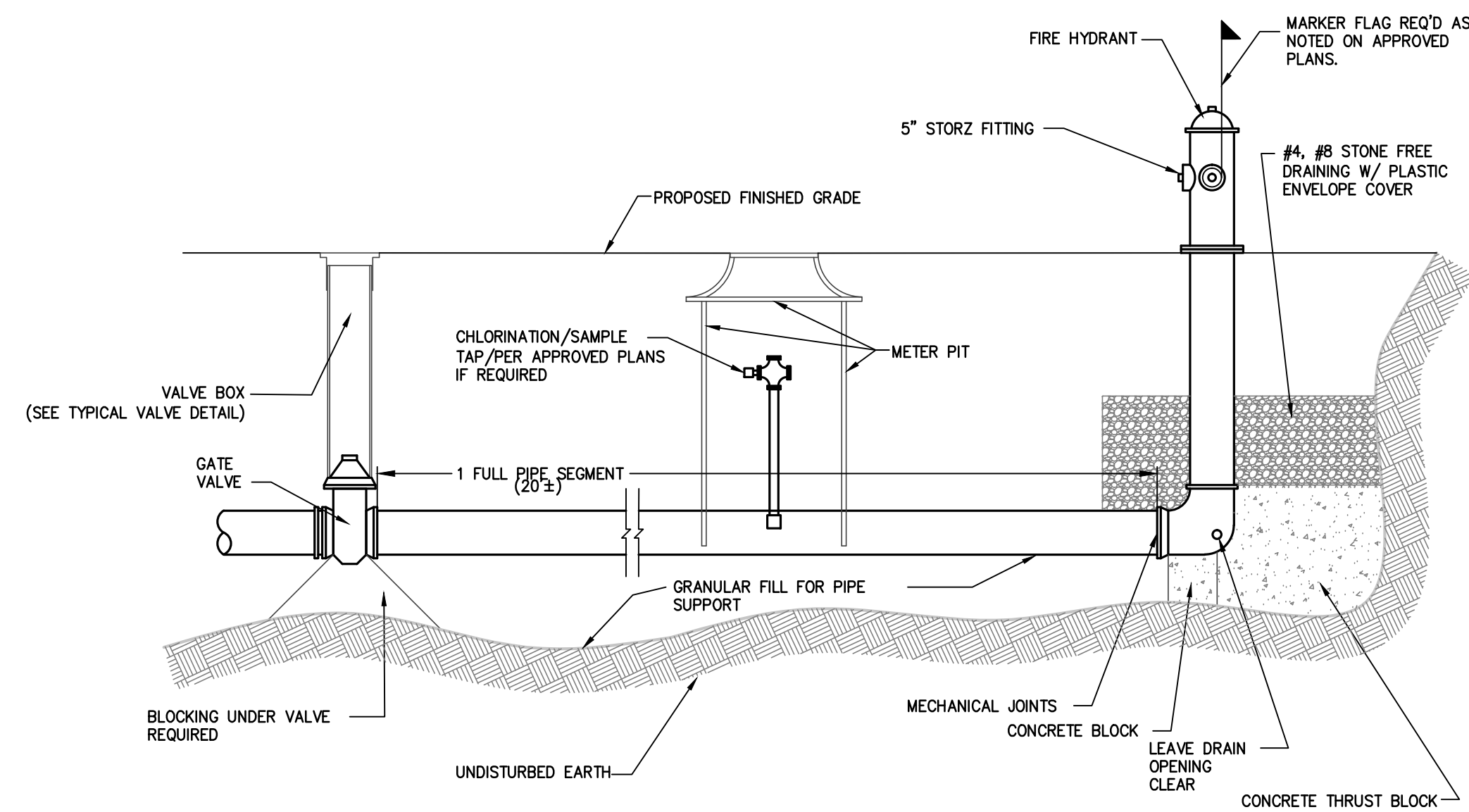
DEPTH OF BEDDING MATERIAL BELOW PIPE	
27" & SMALLER	3"
30" TO 60"	4"
66" & LARGER	6"

(NO SCALE)



(NO SCALE)

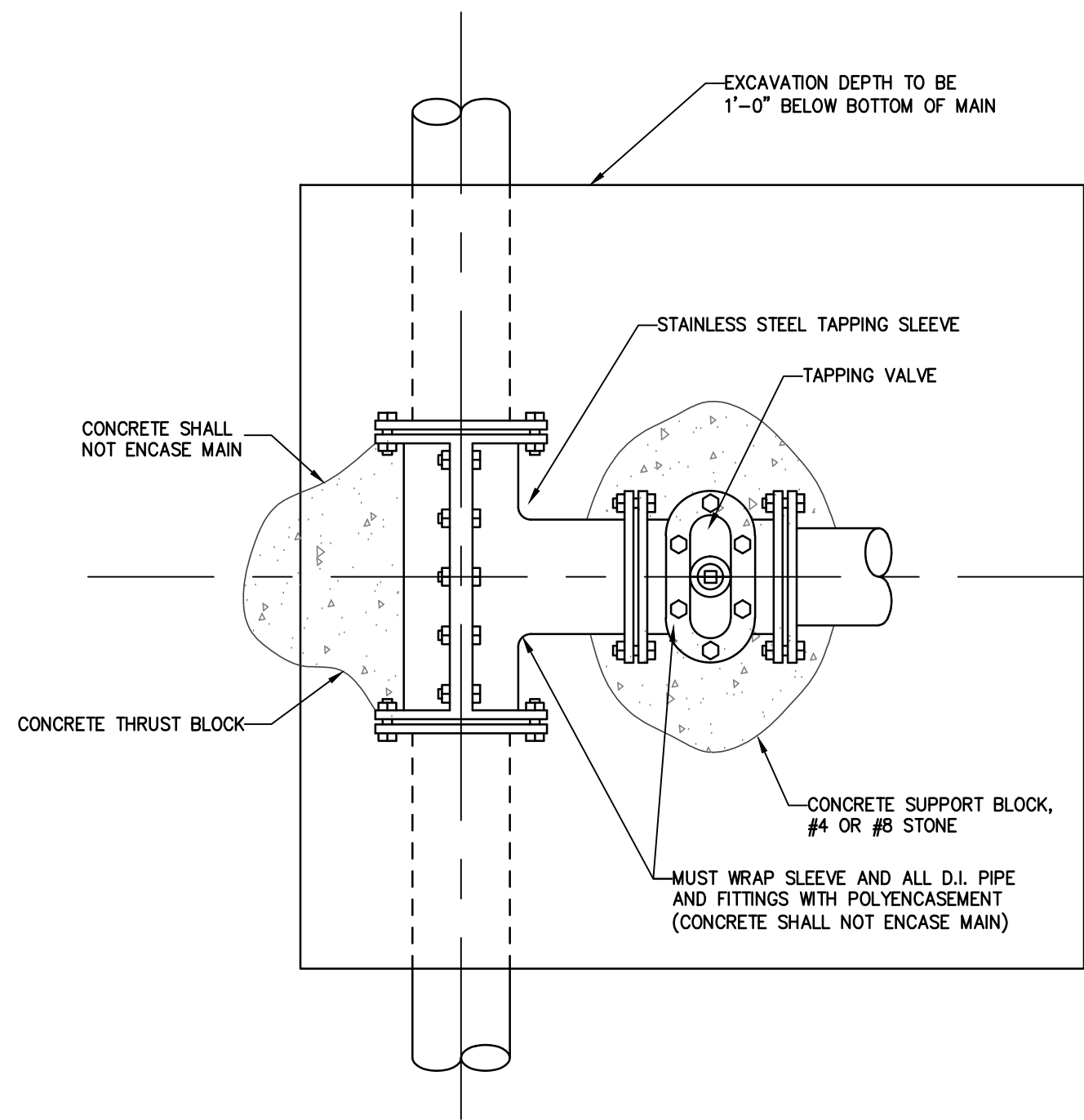
<h1 style="margin: 0;">SANITARY SEWER DETAILS</h1>	
<h2 style="margin: 0;">CITY OF LAWRENCE UTILITIES</h2>	
<h3 style="margin: 0;">9201 HARRISON PARK CT., LAWRENCE, INDIANA 46216</h3>	
RECOMMENDED BY: _____ <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span>UTILITY SUPERINTENDENT</span> <span>DATE</span> </div>	SHEET  <h1 style="margin: 0;">3 OF 7</h1>
APPROVED BY CITY OF LAWRENCE UTILITY SERVICES BOARD APPROVED BY: _____ <div style="text-align: center; margin-top: 5px;">DATE</div>	
REV. 12/30/2010	



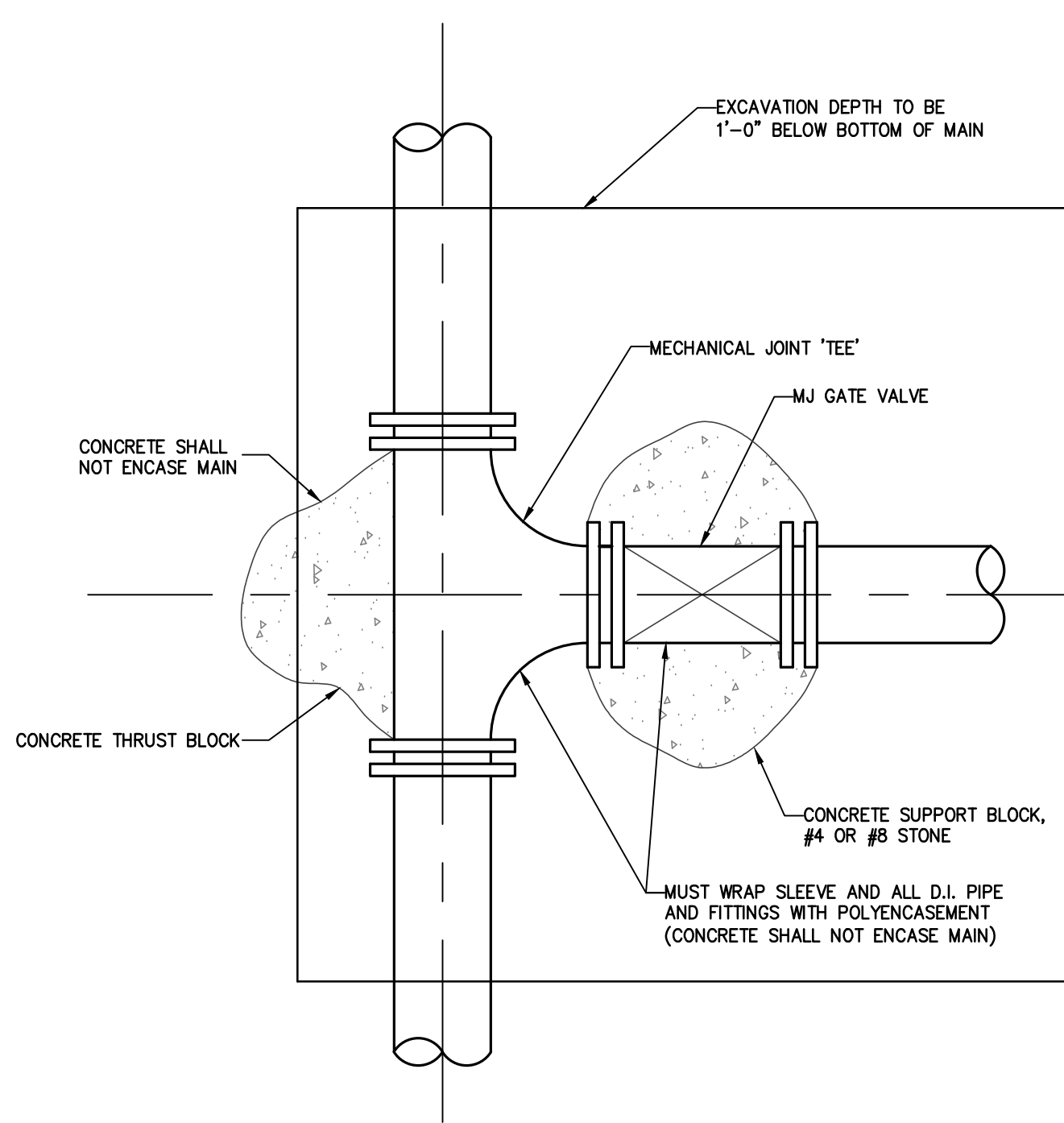
<h1 style="margin: 0;">WATER DETAILS</h1>	
<h2 style="margin: 0;">CITY OF LAWRENCE UTILITIES</h2>	
<b>9201 HARRISON PARK CT., LAWRENCE, INDIANA 46216</b>	
RECOMMENDED BY: _____ <div style="text-align: center; margin-top: -10px;">UTILITY SUPERINTENDENT</div> <div style="text-align: right; margin-top: -10px;">DATE _____</div>	<div style="font-size: 2em; margin-bottom: 10px;">SHEET</div> <div style="font-size: 4em; font-weight: bold;">4 OF 7</div>
APPROVED BY CITY OF LAWRENCE UTILITY SERVICES BOARD APPROVED BY: _____ <div style="text-align: center; margin-top: -10px;">DATE _____</div>	
<div style="text-align: right;">REV. 12/30/2010</div>	

- NOTES:**
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  2. FOR MORE COMPLETE INFORMATION REGARDING POTABLE WATER MAIN SPECIFICATIONS AS TO MATERIALS AND METHODS OF INSTALLATION CONTRACTOR SHOULD CONSULT THE LAWRENCE UTILITIES SPECIFICATIONS AVAILABLE ON OUR WEBSITE AT [WWW.CITYOFLAWRENCE.ORG](http://WWW.CITYOFLAWRENCE.ORG) OR CONTACT LAWRENCE UTILITIES OPERATIONS AT (317)-524-6301 (INSPECTIONS).

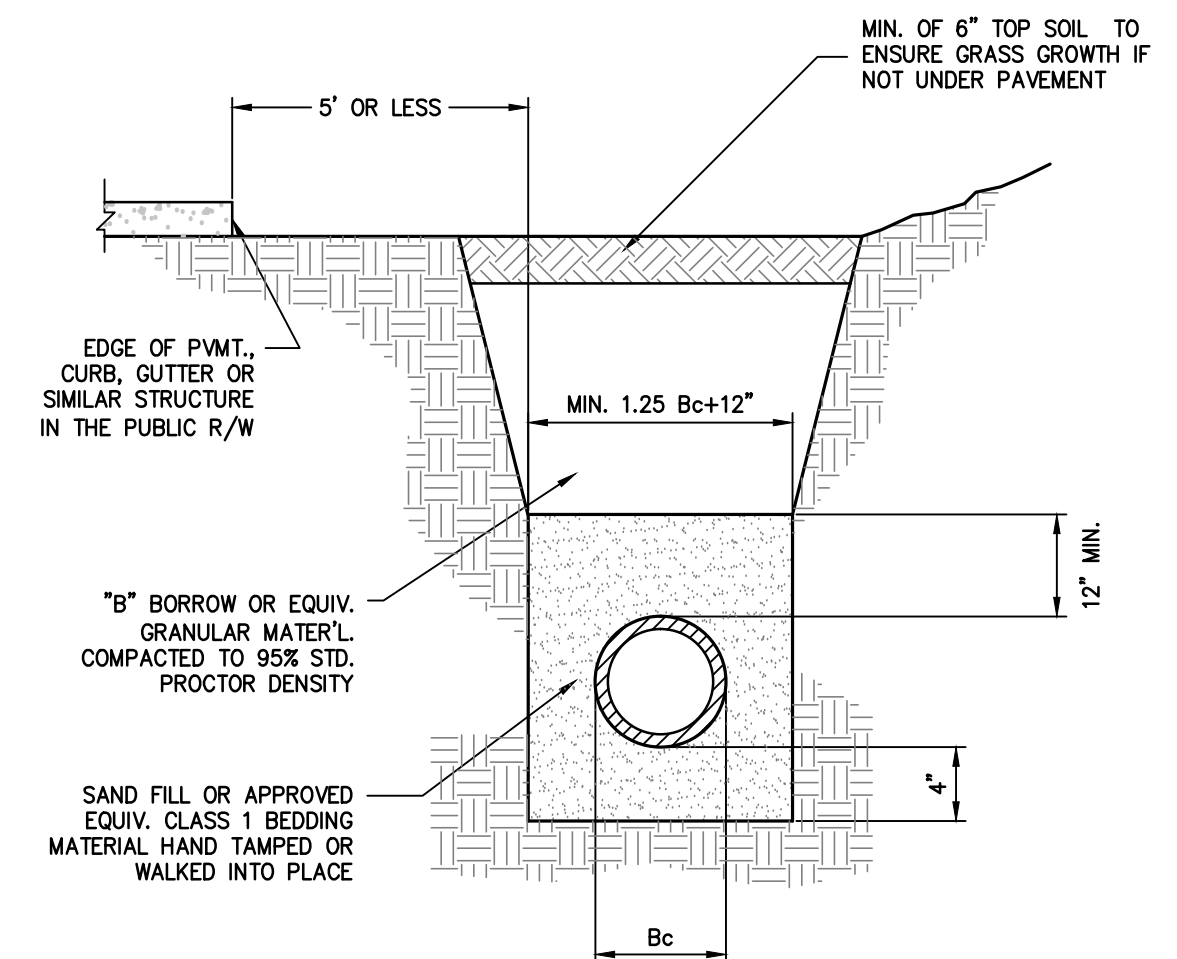




MAIN CONNECTION DETAILS-1 (WET TAP)  
(NO SCALE)

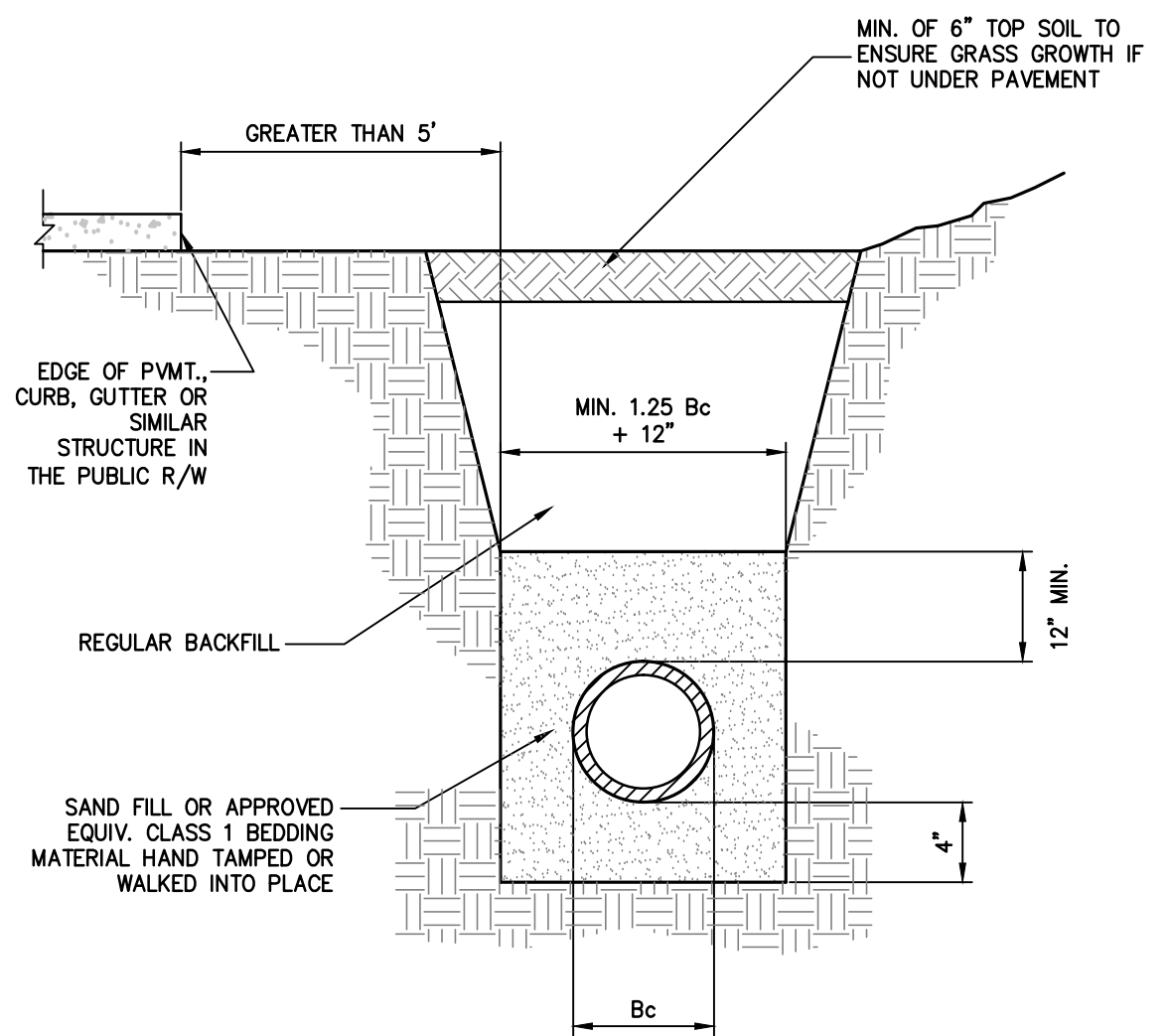


MAIN CONNECTION DETAILS-2 (DRY TAP)  
(NO SCALE)



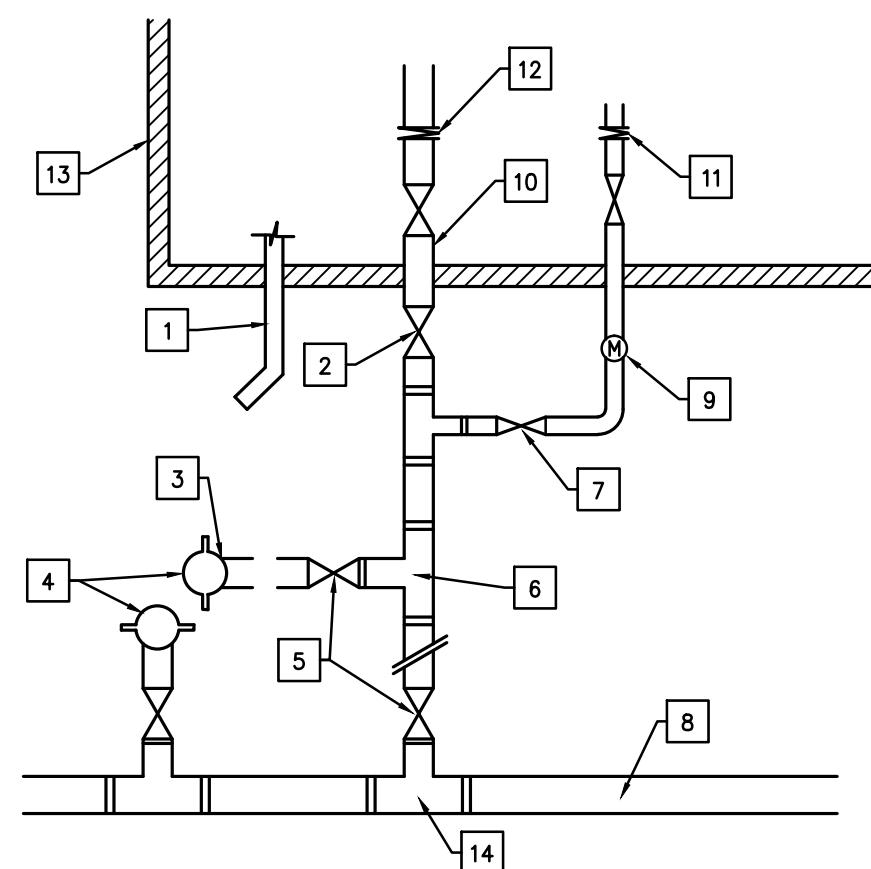
- NOTES:
1. ALL INITIAL BACKFILL SHALL BE INSTALLED IN 6" TO 12" BALANCED LIFTS.
  2. UNDER P.V.M.T. AREAS, TRENCH TO BE BACKFILLED W/ "B" BORROW TO BOTTOM OF BASE, ALL OTHER AREAS SHALL HAVE "B" BORROW BACKFILL TO 1'-0" ABOVE PIPE.
  3. A MIN. 9" OF CLEARANCE SHALL BE PROVIDED ON EACH SIDE OF THE INSTALLED PIPE.

PLASTIC PIPE (PVC & HDPE)  
BEDDING & BACKFILL  
(NO SCALE)



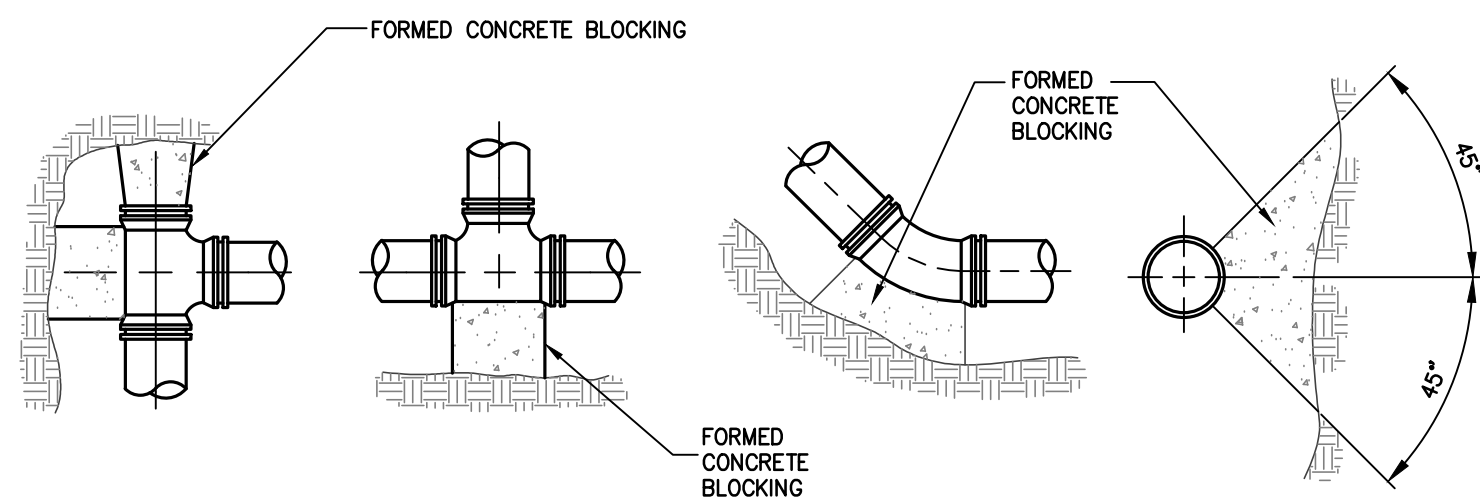
- NOTES:
1. ALL INITIAL BACKFILL SHALL BE INSTALLED IN 6" TO 12" BALANCED LIFTS.
  2. UNDER P.V.M.T. AREAS, TRENCH TO BE BACKFILLED W/ "B" BORROW TO BOTTOM OF BASE, ALL OTHER AREAS SHALL HAVE "B" BORROW BACKFILL TO 1'-0" ABOVE PIPE.
  3. A MIN. 9" OF CLEARANCE SHALL BE PROVIDED ON EACH SIDE OF THE INSTALLED PIPE.

PLASTIC PIPE (PVC & HDPE)  
BEDDING & BACKFILL  
(NO SCALE)



FIRE SERVICE ENTRANCE DETAIL  
(NO SCALE)

- 1 FIRE DEPARTMENT CONNECTION MUST BE WITHIN A 100' RADIUS OF A FIRE HYDRANT AND MUST BE THE DISTANCE AWAY FROM THE STRUCTURE OF 1.5 TIMES THE HEIGHT OF THE STRUCTURE.
- 2 POST INDICATOR VALVE MUST BE FREE STANDING (APPROVAL BY THE LAWRENCE FIRE DEPARTMENT).
- 3 ALTERNATE HYDRANT LOCATION--MAIN MUST BE THE MINIMUM OF A 6".
- 4 FIRE HYDRANT ASSEMBLY -- PER CITY OF LAWRENCE TYPICAL DETAIL.
- 5 MAIN WITH VALVE BOX
- 6 6" MIN FIRE SERVICE LINE TO PIV MAY BE WAIVED BY LAWRENCE UTILITIES & LAWRENCE FIRE DEPARTMENT UPON WRITTEN REQUEST
- 7 DOMESTIC WATER SHUTOFF VALVE WITH BOX.
- 8 EXISTING WATER MAIN
- 9 WATER METER IN PIT
- 10 VALVE
- 11 REDUCED PRESSURE ZONE BACKFLOW DEVICE (IF REQUIRED)
- 12 DOUBLE DETECTOR CHECK VALVE REQUIRED
- 13 BUILDING
- 14 STAINLESS STEEL WET TAP & VALVE



SIZE	TEE & PLUG	90° BEND	45° BEND	22 1/2° BEND	11 1/4° BEND
4"	2.0	2.5	1.5	1.0	1.0
6"	4.0	5.5	3.0	1.5	1.0
8"	6.5	9.0	5.0	2.5	1.5
10"	10.0	14.0	7.5	4.0	2.0
12"	14.0	20.0	11.0	5.5	3.0
14"	19.0	27.0	14.0	7.5	4.0
16"	25.0	35.0	19.0	10.0	5.0
18"	31.5	44.5	24.0	12.5	6.5
20"	38.0	54.5	29.5	15.0	7.5
24"	55.5	78.5	42.5	22.0	11.0
30"	86.5	122.0	66.0	34.0	17.0
36"	124.0	175.5	95.0	48.0	24.5
42"	168.0	237.0	128.5	65.5	33.0

- NOTES:
- MECHANICAL RESTRAINTS MAY BE USED IN LIEU OF POURED CONCRETE BLOCKING WITH PRIOR APPROVAL BY LAWRENCE UTILITIES INSPECTOR. LAWRENCE UTILITIES SHALL DETERMINE TYPE IF APPROVED.

TYPICAL THRUST BLOCKING  
(NO SCALE)

- NOTES:
- ALL VALVES AND FITTINGS ARE REQUIRED TO BE RESTRAINED USING APPROPRIATE MECHANICAL TYPE RESTRAINT DEVICES OR THRUST BLOCKING. THE LAWRENCE UTILITIES INSPECTOR SHALL APPROVE ALL RESTRAINT DEVICES OR BLOCKING AT TIME OF INSTALLATION. ALL RESTRAINED JOINTS, FITTINGS AND VALVES SHALL BE INSPECTED AND APPROVED PRIOR TO PLACING BACKFILL.

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WATER DETAILS	
CITY OF LAWRENCE UTILITIES	
9201 HARRISON PARK CT., LAWRENCE, INDIANA 46216	
RECOMMENDED BY: _____	DATE: _____
APPROVED BY CITY OF LAWRENCE UTILITY SERVICES BOARD	
APPROVED BY: _____	DATE: _____
REV. 12/30/2010	

The diagram illustrates the installation of a TF 250 or 500 Permanent Flush Pit. The main cross-section shows the pit installed below the ground line, with a specified depth of burial. The pit is labeled 'TF500 or TF250'. A meter pit lid is shown at the top, with an approximate 6-inch meter pit section above the main pit body. A drain is located at the bottom of the pit, surrounded by crushed rock or gravel. To the right, a detailed inset titled 'INLET CONNECTION DETAILS' shows three types of connections: a horizontal 2-inch FIP threaded inlet, a vertical 2-inch FIP threaded inlet with a brass ell, and a vertical 2-inch FIP threaded inlet with a brass nipple and saddle tap. A note indicates that the '2\"

The diagram illustrates the assembly of a Meter Box Equipment Valve Riser Set. Key components and labels include:

- ECLIPSE 88 SAMPLING STATION**: Located at the top of the riser.
- ALUMINUM HOUSING**: The upper enclosure for the sampling station.
- ALUMINUM BASE**: The lower enclosure for the sampling station.
- COPPER VENT TUBE WITH OPTIONAL 1/4" BALL VALVE IN PLACE OF 1/4" PET COCK**: A vertical tube extending from the base.
- GROUND LINE**: Indicated by a horizontal line with grass symbols.
- METER BOX EQUIPMENT VALVE RISER SET**: The main vertical assembly.
- 3/4" DOMESTIC COPPER SOFT K-TYPE**: The main supply line.
- BALL VALVE CURBSTOP**: A valve on the supply line.
- CORPORATION STOP**: The connection point to the main water line.
- 3/4" ELBOW MIPT x COPPER**: A fitting connecting the riser to the supply line.
- GALVANIZED STEEL STANDPIPE**: The vertical pipe section below the ground line.
- SPECIFY DEPTH OF BURY**: A label pointing to the standpipe section.
- 1.0'**: A dimension indicating the height of the aluminum base above ground.

Diagram illustrating the cross-section of a curb and gutter structure, showing the following components and dimensions:

- Top Layer:** MIN. OF 6" TOP SOIL TO ENSURE GRASS GROWTH IF NOT UNDER PAVEMENT
- Width:** 5' OR LESS
- Edge:** EDGE OF P.W.M.T., CURB, GUTTER OR SIMILAR STRUCTURE IN THE PUBLIC R/W
- Inner Layer:** MIN. 1.25 Bc+12"
- Height:** 12" MIN.
- Bottom Layer:** "B" BORROW OR EQUIV. GRANULAR MATERIAL, COMPACTED TO 95% STD. PROCTOR DENSITY
- Base:** SAND FILL OR APPROVED EQUIV. CLASS 1 BEDDING MATERIAL HAND TAMPED OR WALKED INTO PLACE
- Radius:** 4"
- Base Width:** Bc

Diagram illustrating the cross-section of a curb and gutter structure, showing various layers and dimensions:

- Top Layer:** MIN. OF 6" TOP SOIL TO ENSURE GRASS GROWTH IF NOT UNDER PAVEMENT
- Width:** GREATER THAN 5'
- Edge Structure:** EDGE OF P.W.M.T. CURB, GUTTER OR SIMILAR STRUCTURE IN THE PUBLIC R/W
- Backfill:** REGULAR BACKFILL
- Dimensions:**
  - MIN. 1.25 Bc + 12"
  - 12" MIN.
  - 4"
  - Bc
- Bottom Layer:** SAND FILL OR APPROVED EQUIV. CLASS 1 BEDDING MATERIAL HAND TAMPED OR WALKED INTO PLACE

Diagram illustrating the installation of a meter pit. The diagram shows a vertical pipe labeled "PROPERTY R/W LINE" on the left. A horizontal line indicates the "IN" (Inlet) and "OUT" (Outlet) directions. The meter is installed within a "METER PIT (PLASTIC)". The meter is secured by a "RING AND LID ASS'Y." (AS MFG. BY VESTAL MFG. OR APPROVED EQUAL) and an "ADAPTER RING (AS REQUIRED)" (AS MFG. BY VESTAL MFG. OR APPROVED EQUAL). The meter is secured by a "LOCKABLE BY-PASS FOR 1-1/4\" AND LARGER INSTALLATIONS." The meter is secured by "BLOCKING AS REQUIRED (TYP.)". The meter is secured by "PRE-CUT NOTCHES FOR SERVICE LINES". A dimension of "36\" MIN." is indicated for the distance from the property line to the meter.

1/2" PREFORMED JOINT FILLER  
REQUIRED IF IN SIDEWALK

PROPOSED FINISH GRADE OR  
SIDEWALK GRADE

4"x4" CONCRETE SIDEWALK

"TOP-HAT" STYLE VALVE BOX TOP

8-INCH PVC RISER

TRACING WIRE RUNS UP OUTSIDE OF  
ALL VALVE BOXES. DRILL HOLE JUST  
UNDER VALVE BOX TOP AND RUN WIRE  
INSIDE BOX 12-INCHES. SECURE WITH  
KNOT.

WRAP VALVE W/ PLASTIC BEFORE  
INSTALLING POURED CONCRETE THRU  
BLOCK

CONCRETE THRUST BLOCK, SOLID  
BLOCKING OR #4 OR #5 CRUSHED  
STONE

AS REQUIRED\*

1/2" PREFORMED JOINT FILLER  
REQUIRED IF IN SIDEWALK

4"x4" CONCRETE SIDEWALK

PROPOSED FINISH GRADE OR SIDEWALK  
GRADE

1" MAXIMUM

AS REQUIRED\*

12

STANDARD VALVE BOX \*

10 GAUGE TRACER WIRE\*\*

WRAP VALVE W/ PLASTIC BEFORE  
INSTALLING POURED CONCRETE THRUST  
BLOCK

CONCRETE THRUST BLOCK, SOLID  
BLOCKING OR #4 OR #8 CRUSHED  
STONE

PROPERLY COMPACTED  
SUB GRADE TO  
95% MAX. DRY DENSITY

\*FOR NORMAL INSTALLATION  
SCHEDULE 40 PIPE EXCEPT  
CLAY & BAILEY CB-2194  
FOR DEEP INSTALLATION  
BAILEY CB-2194 OR  
USED TO EXTEND VALVE  
CENTERING RING AND  
WITHIN 4" FEET BELOW  
OPERATING NUT.

\*\*RUN TRACER WIRE UP THE OUTSIDE  
NYLON WIRE TIES OR DUCT TAPE. IN  
THE TOP OF THE BOX NO MORE THAN  
LEAVING 1' OF WIRE KNOTTED INSIDE

SERVICE SIZE	PIT DIM.	ADAPTER RING	RING & LID	METER YOKE OR OPENING
3/4"	20"x48"	N/A	20"- 6150	Y-502 *
1"	24"x48"	24"x20"	20"- 6150	Y-504 *
1-1/2"	30"x36"	30"x20"	20"- 6150	13"
2"	36"x36"	36"x20"	20"- 6150	17"

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TYPICAL WATERMAIN DETAILS AND SPECIFICATIONS

I. SCOPE OF WORK:

1. This section includes all cold water distribution lines, valves, meter pits, fire hydrants and related appurtenances including excavating and backfilling necessary to complete the work as shown on the construction drawings.

II. APPLICATION:

1. The contractor's work shall conform to the construction drawings and specifications and shall comply with all current City of Lawrence Utilities (LU) applicable ordinances, regulations and standards. The contractor shall also be responsible for the application and acquisition of all bonds and permits required to complete the work.

2. All water mains shall be 6" minimum diameter, except on cul-de-sac bulbs serving five lots or less, 3" diameter water main shall be used.

3. The ends of water mains shall be plugged or capped at the terminal points with manufacturer's recommended watertight device.

III. WORKMANSHIP:

1. Trenching: Lay all pipe in open trenches, except when otherwise designated on the plans for pushing or tunneling. Bell ends to face in the direction of laying.

2. Width of Trench: Excavate trenches sufficient width for proper installation of pipe per manufacturer's recommendation.

3. Sheeting and bracing: Sheet and brace trenches as necessary to protect workmen and adjacent structures. All trenching shall comply with the Occupational Safety and Health Administration Standards.

4. Water Removal: Keep trenches free from water during construction. Under no circumstances shall pipe or appurtenances be laid in standing water. Convey the discharge from trench dewatering to drains or natural drainage channels.

5. Grading Trench Bottoms:  
a. For Ductile Iron pipe, the bottom quadrant of the pipe shall be fully and uniformly supported. Dig out for pipe bell joints. The full load shall rest on the barrel of the pipe. The trench may be excavated below final pipe grade and backfilled with sand or approved equivalent class 1 bedding to bring it back to pipe laying grade.  
b. For PVC pipe 3 inch or larger, excavate bottom of trench to a depth at least 4 inches below grade, and backfill with sand or approved equivalent as shown on sheet 6. Backfill material shall be "heeled in" around the haunches of the pipes. Care shall be taken to prevent rocks and frozen clods of dirt from falling on the pipe.

6. Weather Limitations: No PVC water main or appurtenances shall be laid when ambient air temperature is below 32 degrees F. Furthermore, construction operations shall be suspended if ambient air temperature falls below 32 degrees F.

7. The manufacture's maximum allowable pipe deflection can be used to maintain the vertical and horizontal route unless other fittings (i.e. tees and elbows) or other methods are specifically called out on the plans.

8. Concrete thrust blocks or other mechanical restraining devices shall be used at all tees, bends, fire hydrants and plugs.

9. All Water mains shall maintain a minimum cover of 48" to 54".

10. All fire hydrants shall be situated so that the break away flange is located between 2" and 4" above proposed finish grade. The hydrant shall be clearly indicated out of service by use of manufacturer "Out of Service" signs or other means as approved by the company until hydrant is put in service.

11. Permanent flush pits shall be located per the approved plans.

12. Chlorination/sample taps shall be located on the service side of the water main within 10 feet of the control valve.

13. Temporary chlorination/sample taps shall be completely removed and holes plugged after bacteriological tests are approved. Temporary taps shall be removed prior to final acceptance by the City of Lawrence Utility Services Board.

14. Saw cut or imprint "A" in concrete curb opposite all water valves.

15. All water mains shall be located per approved plans.

16. New Water Main Construction: The Contractor shall record the dimension of each water stub and valve from nearest fire hydrant measured along the water main. The locations of hydrants and water valves, along with any other construction changes are to be incorporated on "markup" original construction drawings. In addition, the Contractor shall provide an electronic version of "as-builts" in the most recent version of AutoCAD and submitted to the Utility's Inspector as soon after completion of construction and testing as possible, and prior to acceptance by the City of Lawrence Utility Services Board. GPS coordinates for all water main fittings, valves, hydrants, hydrant valves, meters, mains, and service lines shall be included on the drawings. A differentially corrected GIS shape file or Personal Geodatabase (.mdb) file shall be provided with the digital record drawing file. GPS coordinates shall be based on NAD 1983 State Plane Indiana East FIPS 1301 (feet) and GPS formatting shall be on sub-meter accuracy. Raw GPS Data must be included with submittal.

17. All PVC water mains will have #10 gauge insulated locator wire attached to the pipe every 10 feet with nylon wire ties or duct tape. Wire will be brought up the outside of all valve boxes and wrapped around all temporary flush hydrants.

IV. BACKFILL REQUIREMENTS:

1. Except as specified in Section III-5, all trenches shall be backfilled with earth or granular material free from large stones, roots, or frozen clods to a depth of at least 12 inches above the top of the pipe. Trenches across all paved areas (including sidewalks) shall be backfilled with full depth granular material conforming to City of Lawrence Street Standard Details extending five feet beyond the back of curbs with a 1:1 slope from bottom of curb to bottom of trench. Trenches parallel to and within 5 feet of paved roadways shall be backfilled in the same manner.

V. MATERIALS:

1. 6" or larger water mains shall be ductile iron (D.I.) pipe conforming to AWWA Standard C-151 or PVC pipe conforming to AWWA Standard C300 or C305 as directed on the plans.

2. Ductile Iron Pipe:  
a. Ductile iron pipe shall be centrifugally cast and shall conform to the latest revision of ANSI Specification A21.51 and AWWA C151. Ductile iron pipe with push-on or mechanical joints, 6-inch to 12-inch diameter shall be pressure Class 350 or Class 50 and 16 inch or larger diameter shall be pressure Class 250 or Class 50. The pipe shall be provided with a minimum laying length of 18 feet.  
b. Ductile iron fitting, 6 inches through 48 inches, shall conform to the latest revision of ANSI Specification A21.10 and AWWA Standard C110. Ductile iron compact fittings, 6 inches through 24 inches shall conform to the latest revision of ANSI Specification A-21.53 and AWWA Standard C153. All fittings shall be mechanical joint type.  
c. Mechanical joints and accessories shall conform to the latest revision of ANSI Specification A21.10 and AWWA Standard C110. Push-on joints shall conform to the latest revision of ANSI Specification A21.11 and Standard AWWA C111. Rubber gaskets shall be vulcanized synthetic rubber and shall conform to the latest revision of ANSI Specifications A21.11 and AWWA Standard C111.  
d. River Crossing pipe shall be ductile iron manufactured in accordance with the requirements of ANSI/AWWA Standard C151/A21.51. Push-on joints for such pipe shall meet the requirement of ANSI/AWWA Standard C111/A21.11, allowing deflection of up to 15 Degrees, and be equal to Griffin SNAP-LOK. Pipe thickness shall be equal to manufacture's standard. Pipe shall have cement mortar lining and seal coating, where applicable, in accordance with ANSI/AWWA Standard C104/A21.4. River Crossing Pipe shall be assembled and hydrostatically tested prior to shipment.

3. 6" thru 12" AWWA C-900 PVC Water Pipe:  
a. Materials: Pipe shall be made from Class 12454-A or Class 12454-B virgin compounds as defined in ASTM D-1784, with an established hydrostatic-design-basis rating of 4,000 PSI for water at 73.4 degrees F.  
b. Pipe and Gasket: Pipe shall have a cast iron outside diameter and shall be suitable for use as a pressure conduit. All Class 150 pipe shall meet the requirements of DR-18. Provisions must be made for expansion and contraction at each joint with an elastomeric sealing ring. Laying length shall be 20 ± 1 inch for all sizes except that up to 10% of the footage may be in random lengths of not less than 10 feet. The pipe shall have an integral bell, and the gasket seal shall be reinforced with a steel band or other rigid material. The joint shall be in compliance with the requirements for ASTM D-3139.  
c. Marking: Pipe shall be marked as prescribed by AWWA standard C900; i.e., nominal pipe size, dimension rating (DR), AWWA pressure class, manufacturer's name and code, and seal of testing agency that verified the suitability of the pipe material for potable water service.  
d. Test Requirements: Each length of pipe (standard and random), including the integral bell, shall be pressure tested to four times the rated pressure for a minimum of five seconds. The pipe must meet all additional test requirements as described in AWWA C900.  
e. Approvals: Pipe shall be listed by Underwriters Laboratories and approved by Factory Mutual.

4. 16" thru 24" AWWA C905 PVC Water Pipe:  
a. Materials: Pipe shall be made from Class 12454-A or Class 12454-B virgin compounds as defined in ASTM D-1784 with an established hydrostatic-design-basis rating of 4,000 PSI for water at 73.4 degrees F.  
b. Pipe: Pipe shall have a cast iron outside diameter and shall be suitable for use as a pressure conduit. Pipe shall be pressure rated 165 psi for DR-25. The bell shall consist of an integral thickened wall section with an elastomeric ring that meets the requirement of ASTM F-477. The gasket shall be reinforced with a steel band or other rigid material. The wall thickness of the bell shall conform to ASTM D-3139. Laying lengths shall be 20 feet ± 1 inch for all sizes except that up to 10% of the footage may be furnished in random lengths of not less than 10 feet.  
c. Marking: Pipe must be marked as prescribed by AWWA Standard C905, i.e., nominal size and OD base (for example, 24" cast iron), PVC, dimension rating (for example, DR-25), AWWA pressure rating (for example, PR 165). AWWA C905, manufacturer's names, and manufacturer's production code including day, month, year shipped, plant, and extruder of manufacture.  
d. Test Requirements: Each standard and random length of pipe shall be tested (including joint) at twice the pressure rating of the pipe. The test shall be for a minimum dwell of five seconds. Hydrostatic pressures are listed below:  

DR	PRESSURE RATING (psi)	HYDROSTATIC PROOF (psi)
25	165	330
18	235	470

  
e. Approvals: Pipe shall be listed by Underwriters Laboratories and approved by Factory Mutual.

5. 2" or 3" Polyvinyl Chloride (PVC) Pipe:  
a. PVC pipe shall conform to the latest revision of ANSI/AWWA (ASTM Specification D1784 and ASTM Specification D-2241).  
b. The appropriate ASTM cell classification shall be either 12454-A or 12454-B.  
c. PVC pipe shall be furnished in standard laying lengths of 20 feet and shall have a minimum pressure class of Class 200 (SDR21).  
d. PVC pipe and couplings shall bear certification marking which shall conform to the latest revision of Section 2.6 of AWWA C900. In addition, the plain end of each pipe length shall have one ring, painted around the pipe at the proper location to allow field checking of the correct setting depth of the pipe in the bell or coupling.  
e. PVC pipe with bell end joints or coupling push-on joints shall conform to the latest revision of ASTM specifications D-313. No solvent cement joint pipe shall be allowed.  
f. Gasket material will be constructed to meet the requirements of ASTM F-477. The lubricant shall have no deteriorating effects on the gasket or pipe. The lubricant containers shall be labeled with manufacturer's name.

6. Copper Tubing:  
Copper tubing shall be seamless, annealed copper tubing complying with Federal Specification WW-799 ("K" soft copper). Fittings shall be wrought copper or cast bronze with Compression Joints.

7. Fire Hydrants:

a. The Contractor shall furnish and install all fire hydrants at substantially the locations as shown on the drawings and details. Hydrants shall be of standard manufacture, of the non-freezing type having a full flow valve and of a type that may be easily lengthened by adding extension sections. Each hydrant shall be fitted with one pumper (5/4") and two hose (2 1/2") nozzles. The nozzles shall have National Standard Thread unless otherwise required to conform to thread size in use on the existing hydrants with a valve opening of not less than 5" and a 6" inlet connection. The direction of the hydrants main valve opening shall be LEFT (counter clockwise).  
b. Hydrant barrels shall be constructed in such a manner that it is not necessary to cut off the water or to excavate to make repairs. The barrel of the hydrant shall be constructed in sections that are to be joined in such a manner that the upper section of the barrel extending above the ground may be separated from the lower section by impact without injury to the stem of the barrel.  
c. The main valve construction at the bottom of the hydrant shall be such as to permit the water to drain from the hydrant barrel when the main valve is closed. The main valve stem seats and packing glands are to be of bronze or approved rust-resisting metal and to be constructed in such a manner as to be easily replaced without excavating.  
d. Hydrants shall be Mueller Super Centurion. (5 1/2" – 2 1/2" – 2 1/2" nozzles) 4 1/2 foot bury depth.  
e. Hydrants shall conform to AWWA Standard C-502.  
f. Hydrants shall be painted SHERWIN WILLIAMS Safety Yellow Paint Number B54Y37, or approved equal.  
g. The pumper nozzle shall be equipped with a 5 1/4-inch Storz Fitting as manufactured by Action Coupling & Equipment Company, Inc. Part Number AAS+137. The hydrant shall come factory equipped with the Storz fitting and shall not be retro-fitted in the field.

8. Valves:  
All valves and stops shall have ends suited or adapters shall be provided for the proper installation in the lines in which they are located. Valves shall meet the following requirements:

a. Valves in Ductile Iron Pipe or PVC Pipe (6" – 12") shall be iron body, bronze mounted, resilient seated gate valves conforming to AWWA Standard C-509. They shall open LEFT (counter clockwise). Valve shall have mechanical joint ends and valve stems shall terminate in 2" wrench nuts. Butterfly valves shall be used for 16" or larger mains, conforming to AWWA Standard C504. Butterfly valves shall be bronze body mounted, resilient seated with a 2" square nut operator, open LEFT (counter clockwise) Mueller B-3211-20 or approved equal.  
b. Ball valves in 2" or 3" PVC shall be standard brass body ball type, round office and conforming to AWWA Standard C-800, with T-heads fitted with female threads.  
c. Corporation stops shall be as manufactured by FORD F-1000 or Mueller B-2500B or approved equal having AWWA taper threaded inlet and copper compression outlet.  
d. Curb stops shall be as manufactured by Ford B44-333 or Mueller B-2520B having compression copper fittings on both ends.  
e. Curb stops shall be a 1/2" brass locking device Mueller H-14338 or approved equal.  
f. Locks, when required for valve box lids or curb stops shall be American Lock Company USA Hardened Series 5200 with 1 1/8 inch shackle and key #43433. No substitutes permitted.

9. Valve boxes shall comply with the following requirements:  
a. For normal installations, valve box shall be 8-inch diameter schedule 40 pipe extended to grade and utilizing a Top Hat Box, Clay & Bailey CB-2194 or approved equal.  
b. For curb stops, valve boxes shall be Tyler 94E series or approved equal.  
c. For deep installations, 6" ductile iron or schedule 40 pipe may be used to extend valve box to grade utilizing a Top Hat Box, Clay & Bailey CB-2194 or approved equal. Deep valve boxes shall use a centering ring and stem extender device to bring valve nut to within 4 1/2 feet below grade. Stem extender shall be bolted onto operating nut.

10. Water Meter Pit shall be 18" to 48" diameter(as noted on the plans) x 48" long. Midstate Polyethylene meter pit, Sonolac PVC or approved equal.

11. Water Meter Pit Lid shall be an 18" or 24" Tyler 6150, with a small operating nut (Standard Water Works Pentagon) or approved equal.

12. Mechanical restraining devices for either PVC or Ductile iron shall be used on all bends larger than 11 1/4-degrees along with concrete blocking two joints from fittings, and shall comply with manufacturers recommended installation procedure. Such devices shall consist of any one of the following.  
a. Megalug with rods\*  
b. Retainer gland\*\*  
c. Anchor coupling  
d. Grip ring  
e. Standard stainless steel threaded rod procedure (5/8" threaded rod anchor eye bolt, Duc-lug, etc).

\*As manufactured for type of pipe material used.  
\*\*NOT TO BE USED ON PVC PIPE.

13. Ductile Iron Water Main corporation stop plug shall be brass, Mueller H10033 or approved equal. When tapping PVC a saddle must be used.

14. Temporary and permanent flush pits shall be the Model TF250 or TF500 2" Blowoff/Flushing hydrant, as manufactured by the Kupferle Foundry Company, St. Louis, Mo., and be located in a standard 18" meter pit with lid. The discharge line shall not include the 45 Degree Bend, but shall otherwise conform to the detail included herein.

VI. DISPOSITION OF UTILITIES:

1. Rules and regulations governing the respective utilities shall be observed in executing all work under this section.

2. It shall be the responsibility of each contractor to verify all existing utilities and conditions pertaining to his phase of the work. It shall also be the contractor's responsibility to contact the owners of the various utilities before work is started. The contractor shall notify in writing the owners and the design engineer of any changes, errors or omissions found on the plans or in the field before work is started or resumes.

3. Where active utilities are encountered, but not shown on the drawings, the Design Engineer and Utility Inspector shall be advised before work is continued. If in conflict, the Project Engineer in consultation with the respective utility personnel, shall jointly determine a plan of action. The location of such active utilities shall be recorded on the construction record drawings.

4. Existing Improvements: The contractor must maintain in operating condition, all active utilities, sewers and other pipe or cable systems that may be encountered.

5. Inactive and abandoned utilities encountered in excavating and grading operations shall be reported to the Design Engineer and the Utility Inspector. They shall be removed, plugged or capped as directed by the Utility Inspector and recorded on the construction record drawings.

VII. PROTECTION OF TREES:

1. General Protection: The Contractor shall be responsible for the protection of tops, trunks and roots of existing trees on the project site that are to remain. Existing trees subject to construction damage shall be boxed, fenced or otherwise protected before any work is started. Excavated materials shall not be piled within drip line of trees to be saved. Remove interfering branches by cutting without injuring trunks and cover scars with tree wound dressing.

VIII. BENCHMARKS, SURVEY MONUMENTS AND CONSTRUCTION STAKES:

1. Contractors shall be responsible for maintaining all benchmarks, survey monuments, construction stakes and other reference points within the construction limits with the INDOT particular contract. If disturbed or destroyed, the contractor shall be responsible for their replacement by the Design Engineer/Production Staff Engineer.

IX. TESTING:

1. The Contractor shall test, chlorinate, and sample all new water mains. LU will charge and flush mains and must be present while all testing is being performed. LU will transport bacteriological samples to laboratory of LU choice. The time and materials for the above plus laboratory testing are to be charged to contractor. The contractor shall pay a \$250 fee for each hydrostatic failure retest by the City, and pay any fees charged for water usage for excessive water flushing operations.

2. After City, or its agent, has charged the system, contractor shall hydrostatic test the entire system within 3 working days under the direct supervision of an authorized inspector. If test results are satisfactory, the Inspector shall certify the test results.

3. If hydrostatic test fail to pass, contractor shall make all necessary repairs within 3 working days.

4. No water tap permits are to be issued for taps onto the new system until both water and sanitary lines have been tested and accepted by the City of Lawrence Utility Services Board.

5. Authorized personnel only are allowed to open or close valves, hydrants and flushing mechanisms.

X. Lawrence Utilities and its employees, are the sole agent authorized to act on behalf of the City of Lawrence in operations and maintenance matters pertaining to the City of Lawrence Water System.

TYPICAL SANITARY SEWER SPECIFICATIONS

1. Current Lawrence Utilities, County and State specifications shall prevail as to materials and methods of construction.

2. Contractor shall notify the Lawrence Utilities Inspector a minimum of 48 hours prior to commencement of sanitary sewer construction. Any sanitary sewer placed without said notification may subject to removal and reconstruction if deemed appropriate by the City of Lawrence.

3. No sanitary sewer construction shall begin until written approval of construction plans is received from Lawrence Utilities and any required IDEM permits have been received.

4. Sanitary sewer material and installation shall be in direct accordance with the Indiana State Board of Health requirements and the Lawrence Utilities Standards for the design and construction of sanitary sewers, as dated on June 15, 2010 or as periodically updated.

5. Sanitary sewers shown on the construction plans may be Poly-Vinyl Chloride Pipe in accordance with A.S.T.M. 3034 (With Cell Classification of 12454-B or 12454-C) for diameters 15" or less, and A.S.T.M. F-679 (With Cell Classification of 12454-C) for pipe diameters greater than 15".

6. Sanitary manholes shall be precast concrete in accordance with A.S.T.M C-478, including concrete adjusting rings. "Intra-Riser" brand adjusting rings may be used with the approval of the Utility Inspector.

7. All fittings and joints shall be compression type flexible gasketed joints and manufactured and installed in accordance with the pipe manufacturer's specifications.

8. Plastic sanitary sewers shall be marked as required by Lawrence Utilities specifications for easy identification.

9. Water and sewer line crossings and separations shall be in accordance with Ten States Standards and Lawrence Utilities Specifications.

a. Where water lines and sewer lines cross and the water line cannot be placed above the sewer line a minimum of 18" with a minimum cover of 48", the sewer line shall be constructed of waterworks grade pipe, either cast iron or PVC.

b. Where water lines and sanitary lines run parallel with one another, a minimum of 10' horizontal separation shall be maintained.

10. Buildings shall be serviced by a 6" diameter (minimum) sanitary sewer lateral, 4.5' to 6.5' deep. The sewer lateral's termination shall be indicated on the surface with a post set immediately above said termination point. The ends shall be plugged and sealed with a watertight plastic plug or cap. Wyes are to be tilted up to 45 degrees from the horizontal, with suitable fittings for all changes in direction and to be identified with locator tape.

11. Manufactured wyes or tees shall be used for lateral connections on new main.

12. No roof drains, footing drains, and/or surface water drains shall be connected to the sanitary sewer system at any time, including a temporary connection during construction.

13. When new connections are made to existing manholes, the existing manhole shall be brought up to the current standards and specifications, which may include the replacement of the manhole.

14. Manholes shall have o-ring gasket, plus 1/2" extrudable gasket (Kent Seal or equal) between all riser and cone sections. All outside joints shall be sealed with trowelable butyl rubber.

15. Manhole waterstops shall be installed at all connections to manholes where flexible type manhole connections are not used.

16. All precast manholes shall be bedded on a granular foundation. The granular foundation shall be compacted with vibratory tamps.

17. The manhole flow channel be U-shaped, with the benchwalls extending to an elevation EVEN with the crown of the pipe.

18. The contractor shall remove by pumping or other suitable methods any water, which may accumulate in trenches.

19. Granular backfill shall be required under all pavement areas and within 5 feet of the edge of pavement and shall be compacted in accordance with the INDOT specifications.

20. Magnetic sewer location tape to be installed in the trench for all--main line sewer and service laterals. Force mains shall be equipped with a 10 gauge insulated locating wire attached every 10 feet with nylon wire or duct tape.

21. The contractor shall furnish to the owner certified infiltration tests showing that the leakage outward or inward (exfiltration or infiltration), by an air test (ASTM C282 preferred) shall not exceed 100 gallons per inch of pipe diameter per mile per day and deflection tests for PVC pipe for 100% of the project and any other tests required for acceptance of sewers by the City of Lawrence Utility Services Board. Any portions not passing said tests for acceptance shall be repaired or replaced at contractor's expense prior to acceptance. Lawrence Utilities personnel shall be present to observe both air test and mandrel test.

22. Inspection by video camera is required prior to acceptance. Developer or Contractor is responsible for production and delivery of CD-ROM and DVD for all sanitary sewers. Review of the video by the utility is required prior to acceptance.

23. Sewer laterals shall have a minimum 1.0% slope. Lateral ends are to be buried between 6 and 8 feet below finished grade.

24. Sanitary sewer pipes shall not be installed at slopes less than that established by the "TEN STATES STANDARDS", most recent edition.

25. DEFLECTION TESTING For PVC sewer (non-lateral) pipe, the entire length shall be tested for acceptance with an approved go-no-go mandrel under the observation of the Utility Inspector. The testing shall be conducted after the final backfill has been in place for at least 30 days (potentially longer depending on weather conditions and at the Utility Inspector's discretion) and all subsurface utilities have been installed. No pipe shall exceed a deflection of 5%. The deflection test shall be run using a mandrel having a diameter equal to 95% of the inside diameter of the pipe. The test shall be performed without a mechanical pulling device. All pipe exceeding the allowable deflection shall be replaced or repaired, at Engineer's discretion, and retested.

26. Manhole castings shall be sealed to the manhole cone section utilizing the "INFI-SHIELD" external sealing system or other approved method or product. Sealing material shall extend from 2 inches below the top of the cone section to 2 inches above the bottom of the casting. Sealing with a trowelable butyl rubber around all outside joints is required and may be done around the casting with the approval of the Utility Inspector.

27. All manholes shall be tested by the Negative Air Pressure (Vacuum) Test. Test shall be performed in accordance with ASTM C 1244-93.

28. Piping not within 2 feet of wet well and valve pit shall be of Pressure Class 350 Ductile Flanged Iron Pipe or Lawrence Utilities approved equal.

29. Piping in and within 2 feet of the wet well and valve pit shall be of Pressure Class 350 Flanged Ductile Iron Pipe.

30. New Sanitary Sewer Construction: The contractor shall provide the Engineer with "as-built" locations and information for all sanitary sewers and laterals including elevations to be checked and verified by a registered land surveyor or professional engineer within 30 days after completion. The contractor shall record the dimension of each lateral connection from the nearest manhole measured along the sanitary sewer. The lateral dimensions and any other construction changes are to be incorporated on "markup" original construction drawings. In addition, the contractor shall provide an electronic version of "as-builts" with GPS coordinates per the requirements in note #16 of the Typical Watermain Details and Specifications.

SANITARY SEWER & WATER MAIN SPECS

CITY OF LAWRENCE UTILITIES

9201 HARRISON PARK CT., LAWRENCE, INDIANA 46216

RECOMMENDED BY: \_\_\_\_\_

UTILITY SUPERINTENDENT DATE

APPROVED BY: \_\_\_\_\_  
APPROVED BY: \_\_\_\_\_

DATE

SHEET

7 OF 7

REV. 12/30/2010