SEWER TESTING PROCEDURES

TESTS FOR NON-PRESSURE PIPELINES FOR TRANSPORT OF SEWAGE

The leakage shall be determined by exfiltration, infiltration or low pressure air.

A. Exfiltration Testing

1. Exfiltration tests shall be made by filling a section of pipeline with water and measuring the quantity of leakage.
2. The head of water at the beginning of the test shall be at least 2 feet above the highest pipe within the section being tested (5 feet for WCDEF sewers).
   a. Should groundwater be present within the section being tested, the head of water for the test shall be 2 feet above the hydraulic gradient of the groundwater.
   b. Should the requirement of 2 feet of water above the highest pipe subject any joint at the lower end of the test section to a differential head of greater than 11.5 feet, another method of testing shall be employed.

B. Infiltration Testing

1. Infiltration tests will be allowed only when the water table gauges determine the groundwater level to be 2 feet or more above the highest pipe of the section being tested.
2. Infiltration test shall be made by measuring the quantity of water leaking into a section of pipeline.
3. Measurement of the infiltration shall be by means of a calibrated weir constructed at the outlet of the section being tested.

C. Allowable Leakage for Non-Pressure Pipelines

1. The allowable leakage (exfiltration or infiltration) for non-pressure pipelines shall not exceed the following in gallons per 24 hours per inch of diameter per 1000 feet of pipe:

Type of Pipe	Leakage
Ductile iron – mechanical or push–on joints	100
Polyvinyl chloride, thermal plastic or fiberglass with rubber joints	100
Cast iron soil pipe	0

2. Regardless of the above allowable leakage, any spurting leaks detected shall be permanently stopped.

D. Low Pressure Air Testing

1. Air testing for acceptance shall not be performed until the backfilling has been completed.
2. Low pressure air tests shall conform to ASTM C 828 or ASTM F1417–92, Section 8.2.2, Time–Pressure Drop Method for a 0.5 psi drop, except as specified herein and shall not be limited to type or size of pipe.
3. All sections of pipelines shall be cleaned and flushed prior to testing.
4. The air test shall be based on the starting pressure of 3.5 to 4.0 psi gauge. The time allowed for the 0.5 psi drop in pressure, measured in seconds, will be computed based on the size and length of the test section by the Engineer.
   a. When groundwater is present, the average test pressure of 3 psig shall be above any back pressure due to the groundwater level.
   b. The maximum pressure allowed under any condition in air testing shall be 10 psig. The maximum groundwater level for air testing is 13 feet above the top of the pipe.
5. The equipment required for air testing shall be furnished by the Contractor and shall include the necessary compressor, valves, gauges and plugs to allow for the monitoring of the pressure, release of pressure and a separable test gauge.
   a. The test gauge shall be sized to allow for the measuring of the 0.5 psig loss allowed during the test period and shall be on a separate line to the test section.

E. Deflection Testing

1. Deflection testing shall be performed 30 days after backfilling. The test shall be made by passing a ball or cylinder no less then 95% of the pipe diameter through the pipe. The test shall be performed without mechanical pulling devices.

F. Manhole Testing

1. General
   a. Each manhole shall be tested by either exfiltration, infiltration or vacuum testing.
   b. A manhole will be acceptable if the leakage does not exceed an allowance of one gallon per vertical foot of depth for 24 hours. Regardless of the allowable leakage, any leaks detected shall be permanently stopped.
2. Exfiltration tests shall be performed after backfilling. The test shall be made by filling the manhole with water and observing the level for a minimum of eight hours.
3. Infiltration tests shall be performed after backfilling when the groundwater level is above the joint of the top section of a precast manhole.
4. Vacuum testing shall be performed after backfilling in accordance with the latest revision of ASTM C1244–02 as follows:
   a. The test head shall be placed at the top of the manhole in accordance with the manufacturer's recommendations.
   b. A vacuum of 10 in. of mercury shall be drawn on the manhole, the valve on the vacuum line of the test head closed, and the vacuum pump shut off. The time shall be measured for the vacuum to drop to 9 in. of mercury.
   c. The manhole shall pass if the time for the vacuum reading to drop from 10 in. of mercury to 9 in. of mercury meets or exceeds the values indicated below:

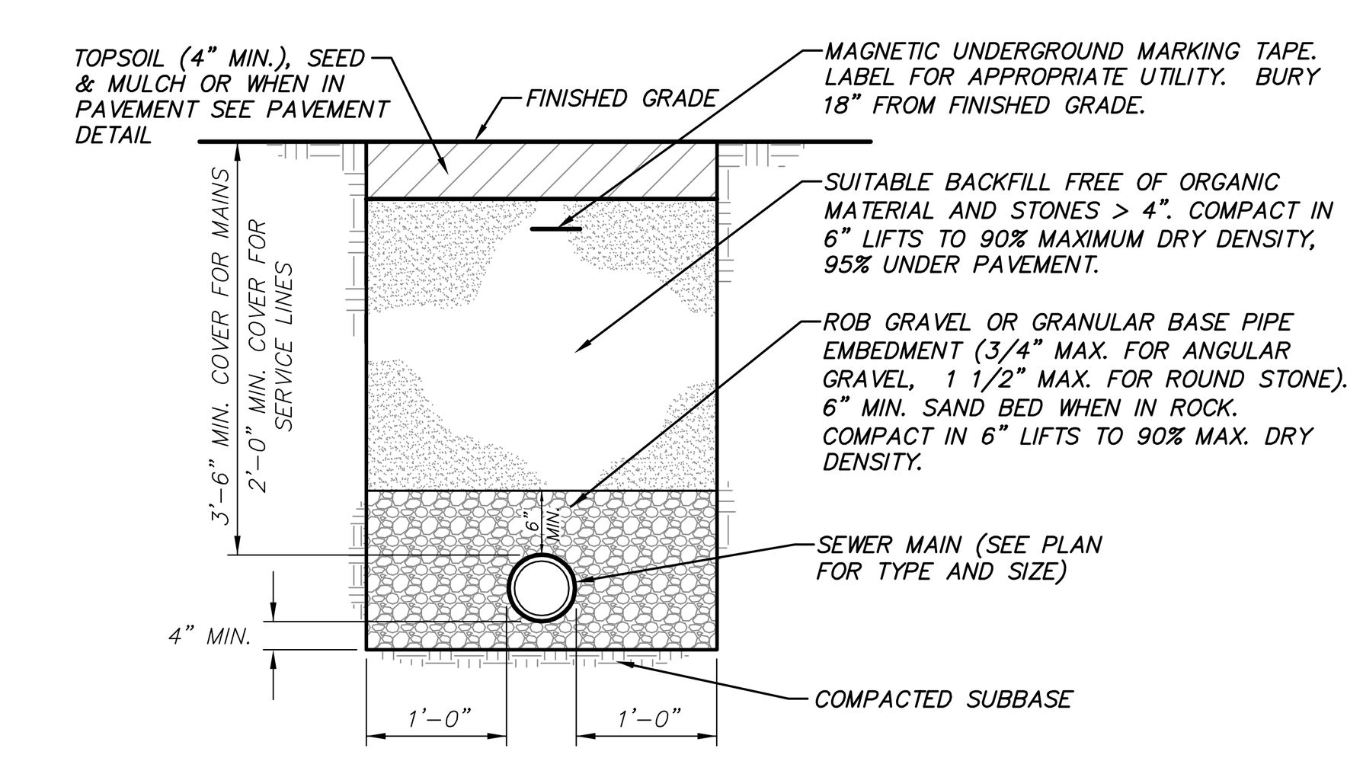
Minimum Test Times for Various Manhole Diameters in Seconds:

Depth (ft)	Diameter (inches) 48	60
	Time (seconds)	
8 or less	20	26
10	25	33
12	30	39
14	35	46
16	40	52
18	45	59
20	50	65

   d. If the manhole fails the initial test, necessary repairs shall be made by an approved method. The manhole shall then be retested until a satisfactory test is obtained.

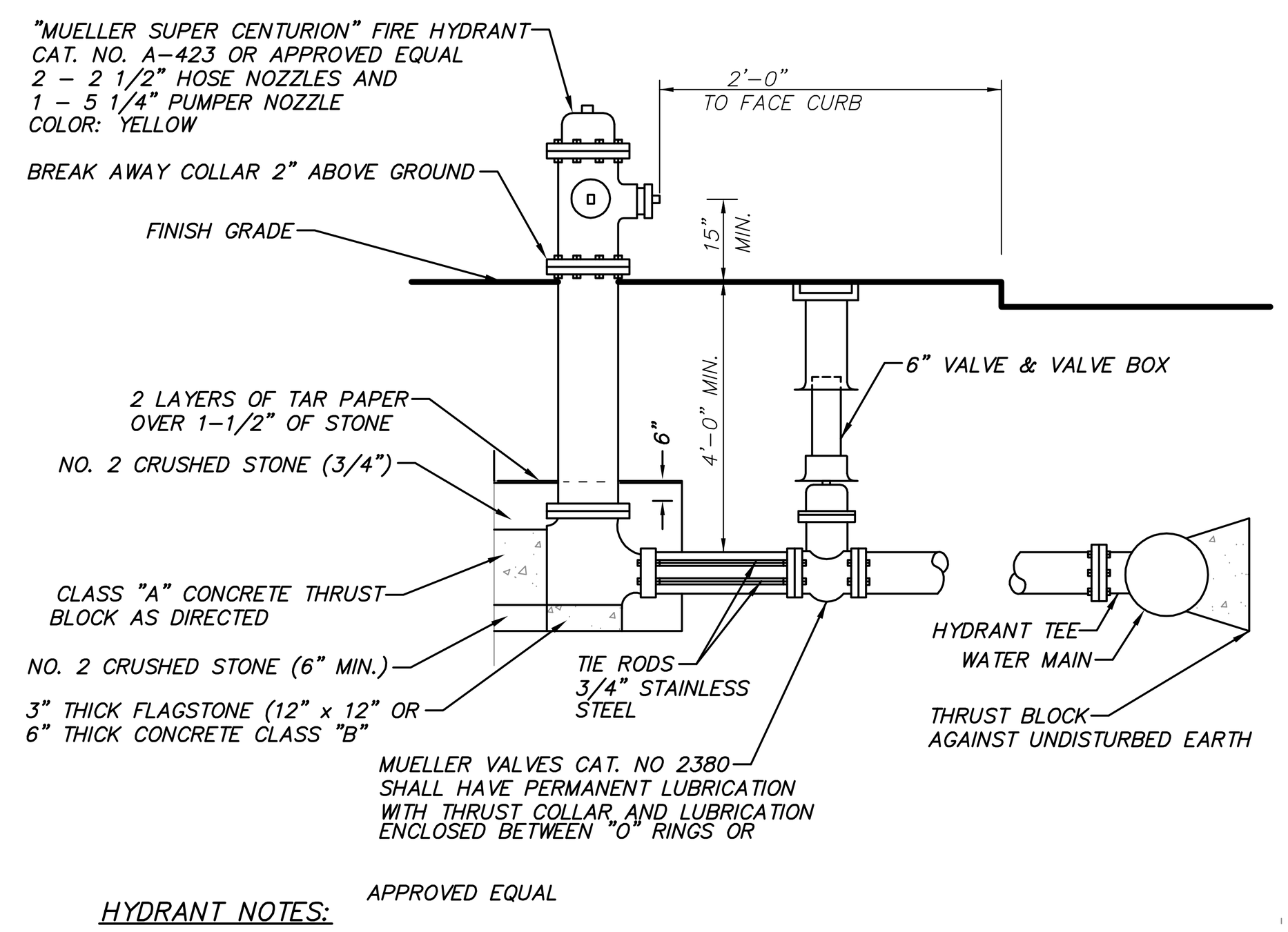
SEWER MAIN NOTES

1. All sewer mains & sewer services shown on these plans shall be polyvinyl chloride (PVC) SDR 35.
2. Sewers shall be laid at least 10 feet 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 horizontal separation, the Design Engineer and Westchester County Department of Health may allow deviation with prior approval on a case–by–case basis, if supported by data from the Design Engineer. The horizontal separation also applies to service connections.
3. Sewers crossing water mains shall be laid to provide a minimum vertical distance of 18 inches between the outside of the water main and 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 maintain line and grade. In cases where it is not practical to maintain a 10 foot horizontal separation, the Design Engineer and Westchester County Department of Health may allow deviation with prior approval on a case–by–case basis, if supported by data from the Design Engineer prior to sewer line installation. The vertical separation also applies to service connections.
4. Sanitary sewer service lines shall be tested in conjunction with the sewer mains to the property line or easement line, and in accordance with the latest Westchester County Department of Health Rules & Regulations.
5. Testing of the manholes with the pipeline shall not be permitted. Manholes & sanitary sewer lines shall be tested independently of each other.
6. The owner/applicant shall be responsible for acquiring supervision of the construction of the sanitary sewer main system by a person or firm qualified to practice professional engineering in the state of New York.
7. The owner/applicant shall be responsible for providing Three (3) copies of as–built drawings signed and sealed by a licensed and registered New York State Professional Engineer to the Westchester County Department of Health at the completion of the construction.
8. The Design Engineer, Westchester County Department of Health, and Village Engineering Department shall be notified forty eight (48) hours before construction is started.
9. The sanitary sewer mains shall not be placed into service until a certificate of construction compliance has been submitted to and accepted by the Westchester County Department of Health.
10. The Westchester County Department of Health and the New York City Department of Environmental Protection must be notified forty eight (48) hours prior to pressure testing the sewer main improvements.
11. Manhole frames & covers to be campbell pattern #1007C for 24" opening or approved equal. M.H. covers to be marked "SEWER" and to have six 3/4"ø hole vents. (use solid covers where necessary.)
12. The exterior of all manholes shall be covered with an approved asphalt waterproofing.
13. Concrete base slabs shall be air entrained concrete with a minimum design strength of 3,000 psi.
15. The contractor shall submit shop drawings of the precast manholes to the Design Engineer for review and acceptance.
16. Precast manholes shall have minimum reinforcement of 0.12 sq.. in. per lin. ft. for 48" barrel & be designed in accordance with A.S.T.M. C–478, and withstand an H–20 design loading.
17. Precast base sections to have the required number of gaskets and openings as shown and specified.
18. Precast manhole sections shall employ a watertight gasket arrangement between each section approved by the Design Engineer.
19. Openings for pipes shall be precast or machine cored. Gaskets or collars for pipe connections to manholes shall be resilient and watertight and compatable with the type of pipe being used.
20. The length of pipes entering or leaving any manhole shall be greater than 2'–0".
21. Precast manholes under 6'–0" deep shall have a "Flat Top" slab roof.
22. Gaskets or collars for pipe connections to manhole shall provide a minimum of 0.1' drop across the manhole.



SEWER MAIN TRENCH DETAIL

(N.T.S.)

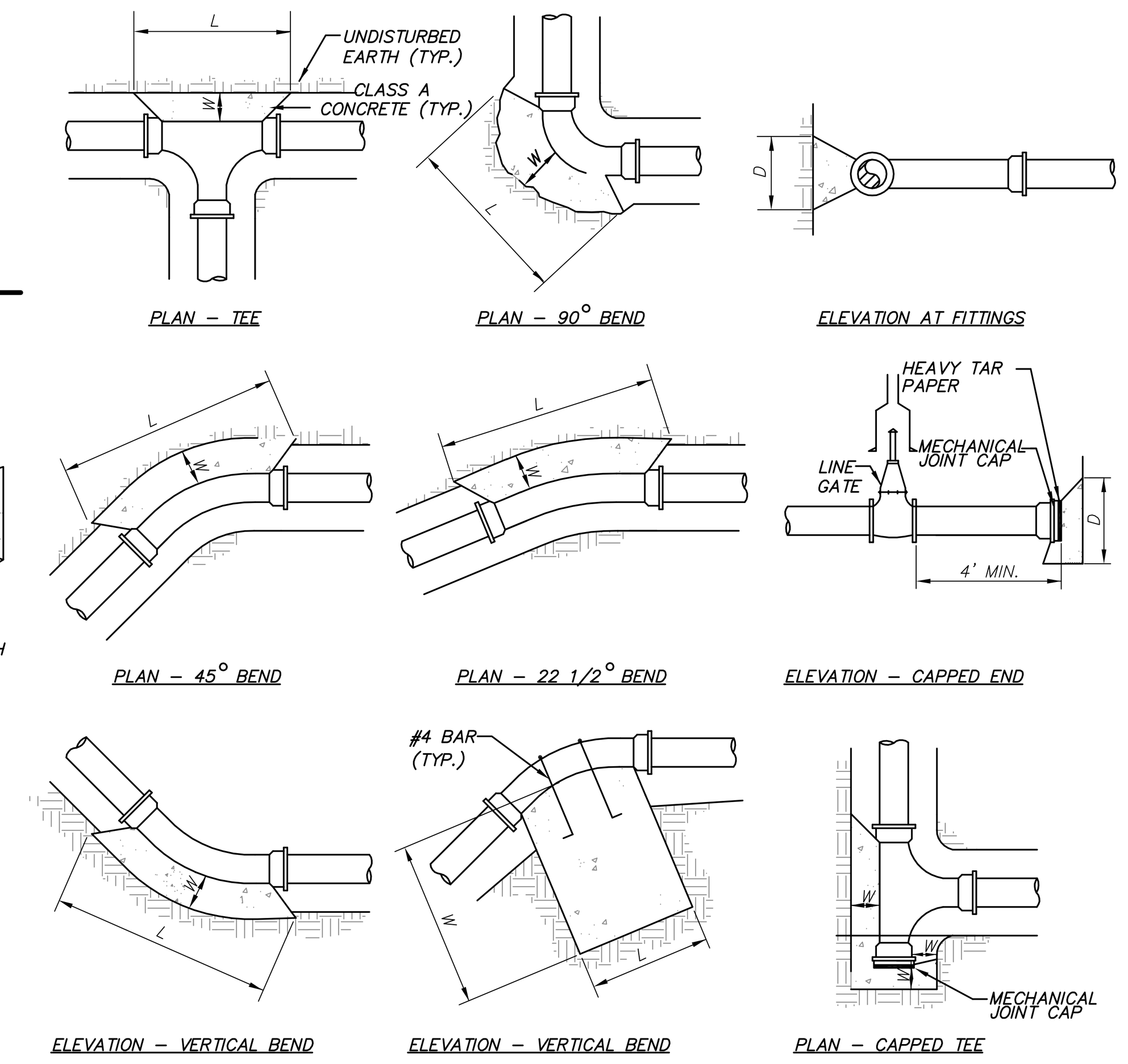


HYDRANT NOTES:

1. PUMPER OUTLET SHALL FACE STREET;
2. HOSE OUTLETS SHALL BE PARALLEL TO STREET.
3. 1–1/2" STONE SHALL BE PLACED AROUND THE HYDRANT FROM THE BOTTOM OF THE TRENCH, BUT AT LEAST 6" BELOW THE BASE OF THE HYDRANT TO 6" ABOVE THE WASTE OPENING AND TO A DISTANCE OF 12" AROUND THE ELBOW.
4. IF GROUND WATER IS ENCOUNTERED WITHIN 7' OF SURFACE, THEN HYDRANT DRAINS SHOULD BE PLUGGED. WHEN THE DRAINS ARE PLUGGED, THE BARRELS MUST BE PUMPED DRY AFTER USE DURING FREEZING WEATHER. WHERE HYDRANT DRAINS ARE NOT PLUGGED, A GRAVEL POCKET OR DRY WELL SHALL BE PROVIDED UNLESS THE NATURAL SOILS WILL PROVIDE ADEQUATE DRAINAGE. HYDRANT DRAINS SHALL NOT BE CONNECTED TO OR LOCATED WITHIN 10 FEET OF SANITARY SEWERS OR STORM DRAINS.

HYDRANT DETAIL

(N.T.S.)



THRUST BLOCK SCHEDULE									
PIPE SIZE	CAP/TEE L	CAP/TEE D	22 1/2° L	22 1/2° D	45° L	45° D	90° L	90° D	W
4"	2'	1.5'	2'	1.5'	2'	1.5'	2'	1.5'	1.5'
6"	2'	1.5'	2'	1.5'	2'	1.5'	2'	1.5'	1.5'
8"	3'	2'	2'	2'	2'	2'	3'	2'	1.5'
10"	3'	2'	2'	2'	2'	2'	3'	2'	1.5'

THRUST BLOCK DETAILS

(N.T.S.)

DUCTILE IRON PIPE WATER MAIN NOTES:

1. All water mains shall be class 52 cement lined tyton joint ductile iron pipe, push on (rubber gasket) type and installed with 2 bronze wedges for continuous electrical conductivity per joint. All pipe and appurtenances shall be in accordance with the latest edition of AWWA/ANSI standard C600, C150/A21.50, C151/A21.51, C110/A21.10 and C104/A21.4.
2. All water main fittings shall be Class 350 ductile iron mechanical joints with "Megalug" fittings in accordance with the latest AWWA/ANSI standard C111/A21.11.
3. All water mains and appurtenances shall be installed in accordance with the latest edition of AWWA C600.
4. Gate valves shall be "CLOW" or approved equal, iron body, non–rising stem conventional packing, resilient seated, mechanical joint with restrained joint gaskets, pressure class 50, opening shall be left (CCW) and operation shall be by 2" square wrench nut.
5. Every pipe joint and every fitting shall be secured with "Field Lok 350" restrained joint gaskets or "Megalug" fittings unless otherwise authorized by the Design Engineer, and with prior approval.
6. All water mains and appurtenances (including water service lines up to the curb stop) shall be pressure tested and leakage tested to the satisfaction of the Design Engineer, and the Westchester County Department of Health. This shall be done in accordance with the latest edition of AWWA Standard C600.
7. All water mains and appurtenances shall be flushed, disinfected, and tested to the satisfaction of the Design Engineer, and the Westchester County Department of Health. This shall be done in accordance with the latest edition of AWWA Standard C651, except for section 4.4.2 "the tablet method" will not be allowed.
8. Water mains shall be laid at least 10 feet horizontally from any existing or proposed sanitary or storm sewer main. The distance shall be measured edge to edge. In cases where it is not practical to maintain a 10 foot separation, the Design Engineer and Westchester County Department of Health may allow deviation with prior approval on a case–by–case basis, if supported by data from the Design Engineer prior to the installation of the water line.
9. Water mains crossing sanitary or storm sewer mains shall be laid to provide a minimum vertical distance of 18 inches 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 maintain line and grade. The vertical separation also applies to water service connections. In cases where it is not practical to maintain a 10 foot separation, the Design Engineer and Westchester County Department of Health may allow deviation with prior approval on a case–by–case basis, if supported by data from the Design Engineer prior to the installation of the water line.
10. The Design Engineer, Westchester County Department of Health, and Village of Tarrytown shall be notified forty eight (48) hours before construction is started.
11. The water mains shall not be placed into service until a certificate of construction compliance has been submitted to and accepted by the Westchester County Department of Health.
12. The Westchester County Department of Health and the Village of Tarrytown must be notified forty eight (48) hours prior to pressure testing the water main improvements.
13. Deflection of joints on water main shall not exceed 50% of the maximum deflection recommended by the manufacturer, or as ordered by the Design Engineer.
14. Exact location of all fittings shall be approved in the field by the Design Engineer.
15. The Design Engineer shall inspect all thrust blocks and sewer/drainage crossings prior to backfill.
16. The contractor shall notify the Design Engineer every day that water main construction shall occur.

DUCTILE IRON PIPE WATER TESTING PROCEDURES

TESTS ON PRESSURE PIPING FOR TRANSPORT OF WATER

A. Hydrostatic Pressure Test
Hydrostatic testing shall be performed in accordance with the revision of AWWA C600, Section 5.2, "Hydrostatic Testing".

1. Test pressure shall be as scheduled or, where no pressure is scheduled, shall be 150% of the maximum working pressure or 150 psi, whichever is higher.
2. Test pressure shall be held on the piping for a period of at least 2 hours, unless a longer period is requested by the Engineer.
3. The test medium shall be water.

B. Hydrostatic Leakage Test

1. The leakage test shall be conducted concurrently with the pressure test.
2. The rate of leakage shall be determined at 15–minute intervals by means of volumetric measurement of the makeup water added to maintain the test pressure. The test shall proceed until the rate of leakage has stabilized or is decreasing below an allowable value, for three consecutive 15–minute intervals. After this, the test pressure shall be maintained for at least another 15 minutes.
   a. At the completion of the test, the pressure shall be released at the furthermost point from the point of application.
3. All exposed piping shall be examined during the test and all leaks, defective material or joints shall be repaired or replaced before repeating the tests.
4. The allowable leakage will be determined by the following formula.

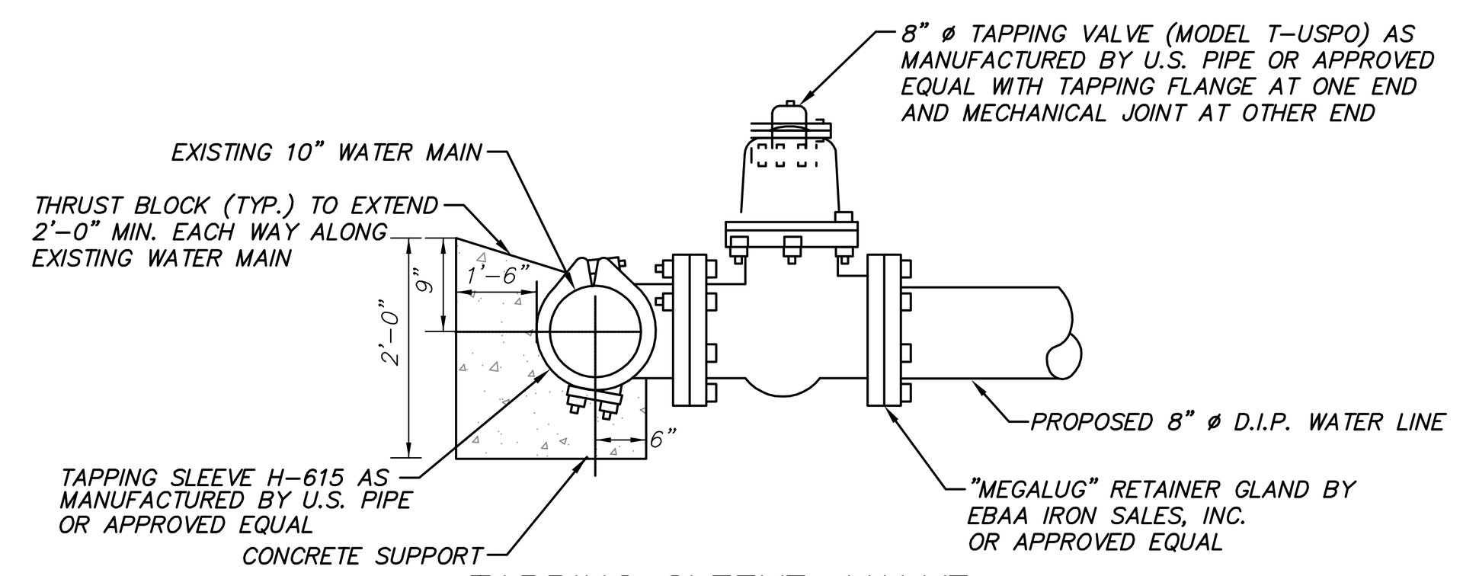
$$Q = \frac{LD\sqrt{P}}{148,000}$$

Where:
Q = quantity of makeup water, in gallons per hour
L = length of pipe tested, in feet
D = nominal diameter of the pipe, in inches
P = average test pressure during the hydrostatic test, in pounds per square inch (gauge)

5. Regardless of the above allowables, any visible leaks shall be permanently stopped.
6. The test medium shall be water.

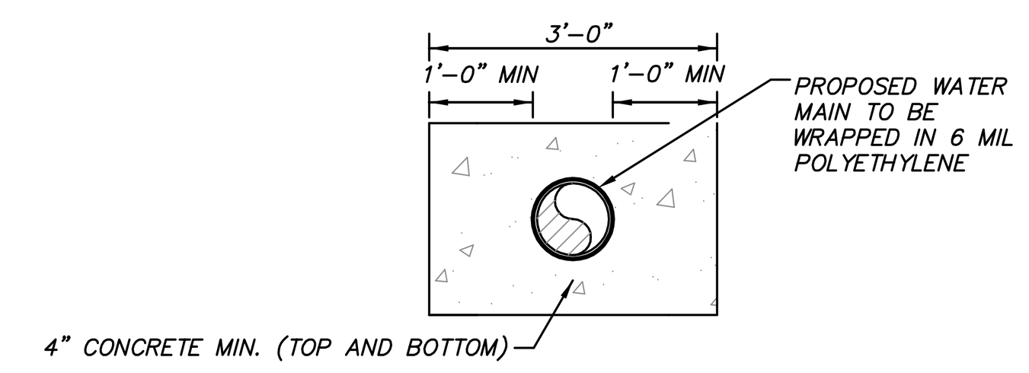
C. Disinfection
Prior to placing the water main into service, the new pipe shall be cleaned and disinfected in accordance with the latest revision of AWWA C651, Section 4.4.3, "The Continuous Feed Method". The "Tablet Method" will not be accepted.

1. All work under this section shall be performed in the presence of the Design Engineer, and a representative of the public health authority having jurisdiction, as required.
2. Chlorination shall be scheduled such that sampling and flushing will be performed during normal daylight working hours. The contractor shall provide acceptable backflow prevention on all supply water to prevent any potential backflow contamination or cross connection.
3. Chlorination shall be by the use of a solution of water and liquid chlorine, calcium hypochlorite or sodium hypochlorite and the solution shall be contained in the pipe or structure as specified.
4. Prior to chlorination, all dirt and foreign matter shall be removed by a thorough cleaning and flushing of the pipeline or structure.
5. The chlorine solution shall be introduced to pipelines through corporation stops placed in the horizontal axis of the pipe, to structures by means of tubing extending directly into the structure, or other approved methods.
6. The application of the chlorine solution shall be by means of a controlled solution feed device. The rate of chlorine solution flow shall be in such proportion to the rate of water entering the pipe or structure that the resulting free chlorine residual shall be between 25 and 50 parts per million (PPM) or milligrams per liter (mg/l).
7. The chlorine treated water shall be retained in the pipe or structure at least 24 hours, unless otherwise directed. During the retention period, all valves and hydrants within the treated sections shall be operated.
8. The chlorine residual shall be not less than 10 PPM (or mg/l) at any point in the pipe or structure at the end of the 24–hour retention period.
9. When making repairs to, or when specified, structures and portions of pipelines shall be chlorinated by a concentrated chlorine solution containing not less than 200 PPM (mg/l) of free chlorine. The solution shall be applied with a brush or sprayed on the entire inner surface of the empty pipes or structures. The structures disinfected shall remain in contact with the strong chlorine solution for at least 30 minutes.
10. After the required retention of chlorinated water in the pipe or structures, they shall be thoroughly flushed until the replacement water shall, upon test, both chemically and bacteriological, be proven equal to water quality served by the public from the existing water supply system.
11. The disposal of chlorinated water from any pipe or structure shall be such that it will not cause damage to any vegetation, fish, or animal life.
12. The Contractor shall make all arrangements for the testing of water quality by an approved independent laboratory. Two acceptable bacteriological test, taken at least 24 hours apart, shall be collected from the new water main. At least 1 set of samples must be collected from every 1,000 LF of the new water main, plus one set from the end of the line and at least one set from each branch. The results for all tests shall be forwarded to the Design Engineer and the public health authority having jurisdiction.
13. All water quality requirements shall be fulfilled prior to the passage of any water through the new system to a public supply or the use of the new system.



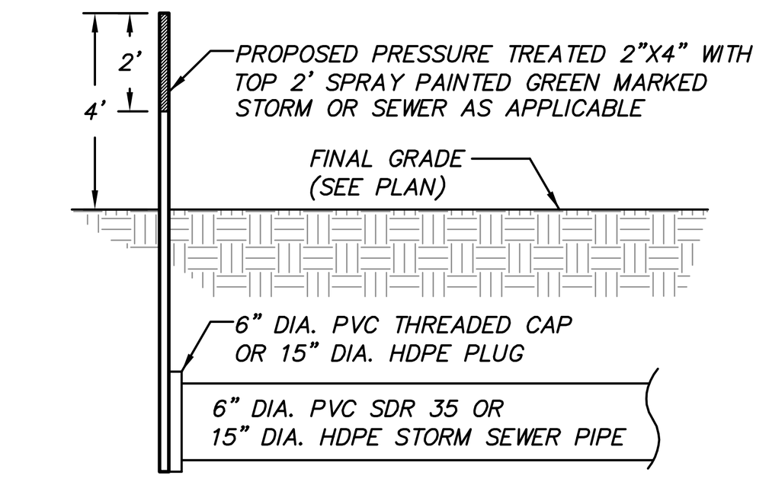
TAPPING SLEEVE, VALVE, AND THRUST BLOCK DETAIL

(N.T.S.)



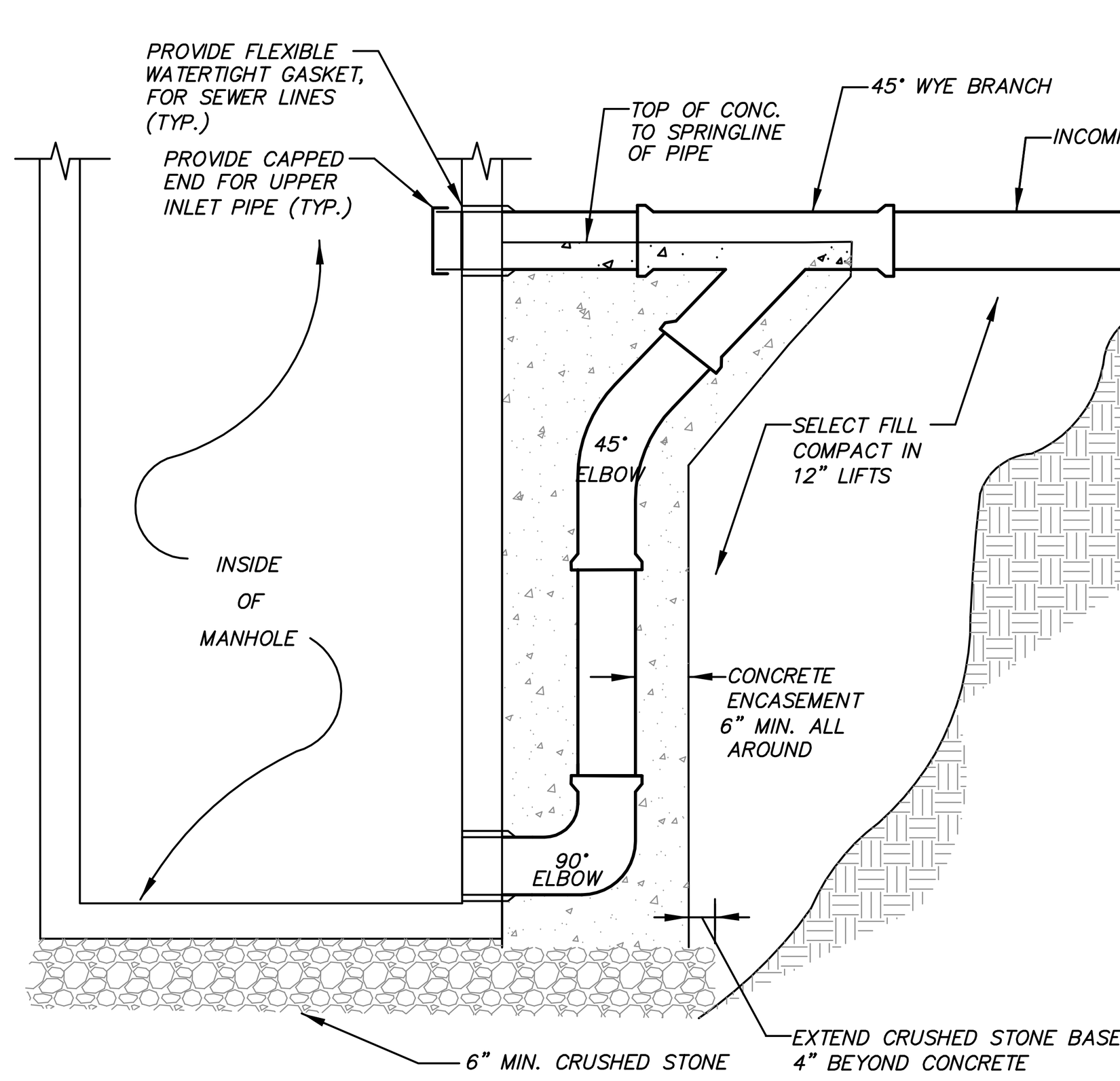
WATER MAIN CONCRETE ENCASEMENT DETAIL

(N.T.S.)



FUTURE STORM/SEWER MAIN CAPPED END DETAIL

(N.T.S.)

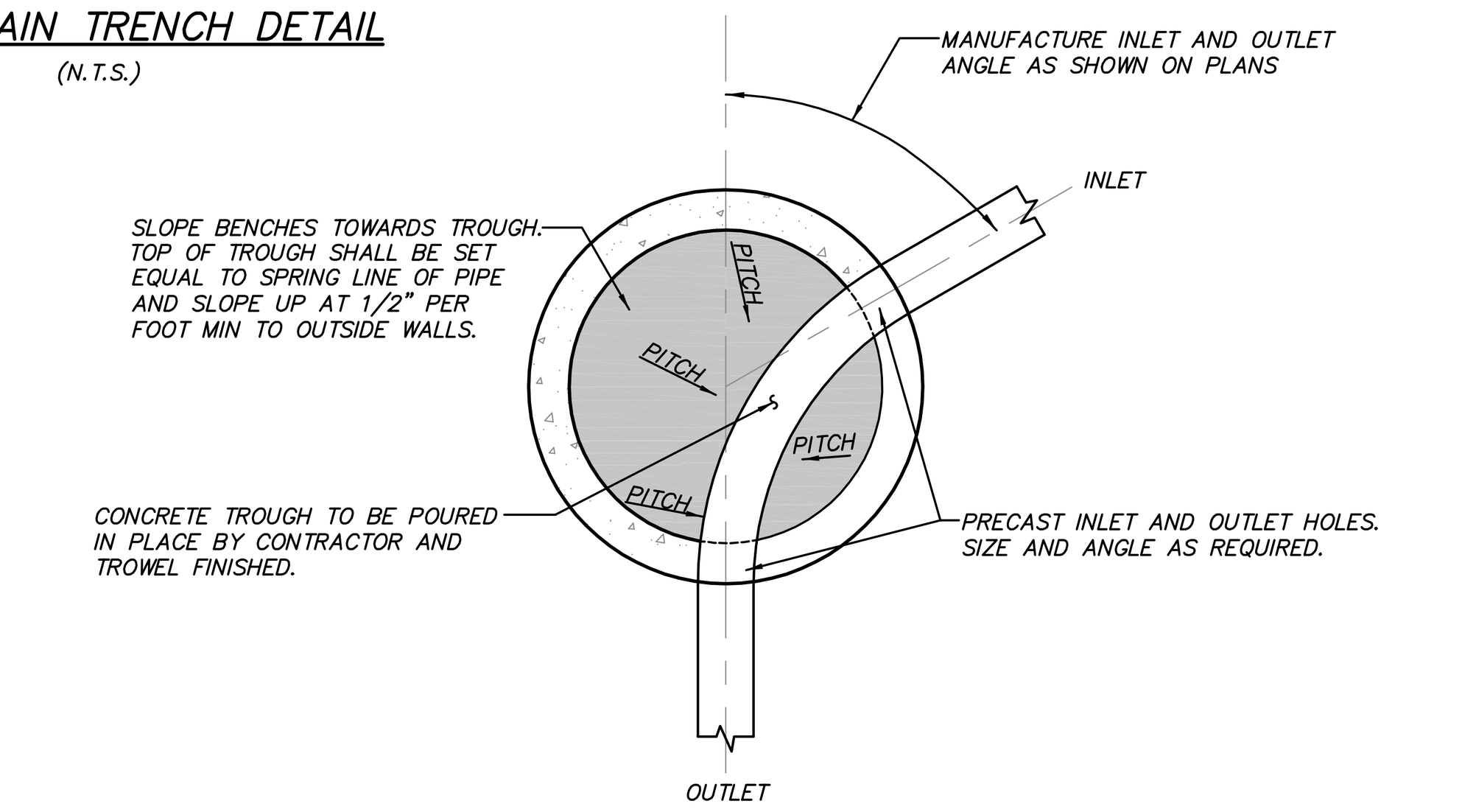


EXTERNAL DROP MANHOLE NOTES:

1. TO BE USED WHEN INCOMING SEWER IS MORE THAN 2'–0" HIGHER THAN THE OUTGOING SEWER.
2. PIPE SIZE AND TYPE OF DROP CONNECTION TO BE SAME AS MAIN OR LATERAL.
3. ALL JOINTS SHOULD BE SEALED INSIDE AND OUT WITH CEMENT GROUT CONTAINING 2 PARTS CEMENT AND 1 PART SAND AND ANTI–HYDRO OR OTHER APPROVED ADDITIVE IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS TO INSURE WATER TIGHTNESS.

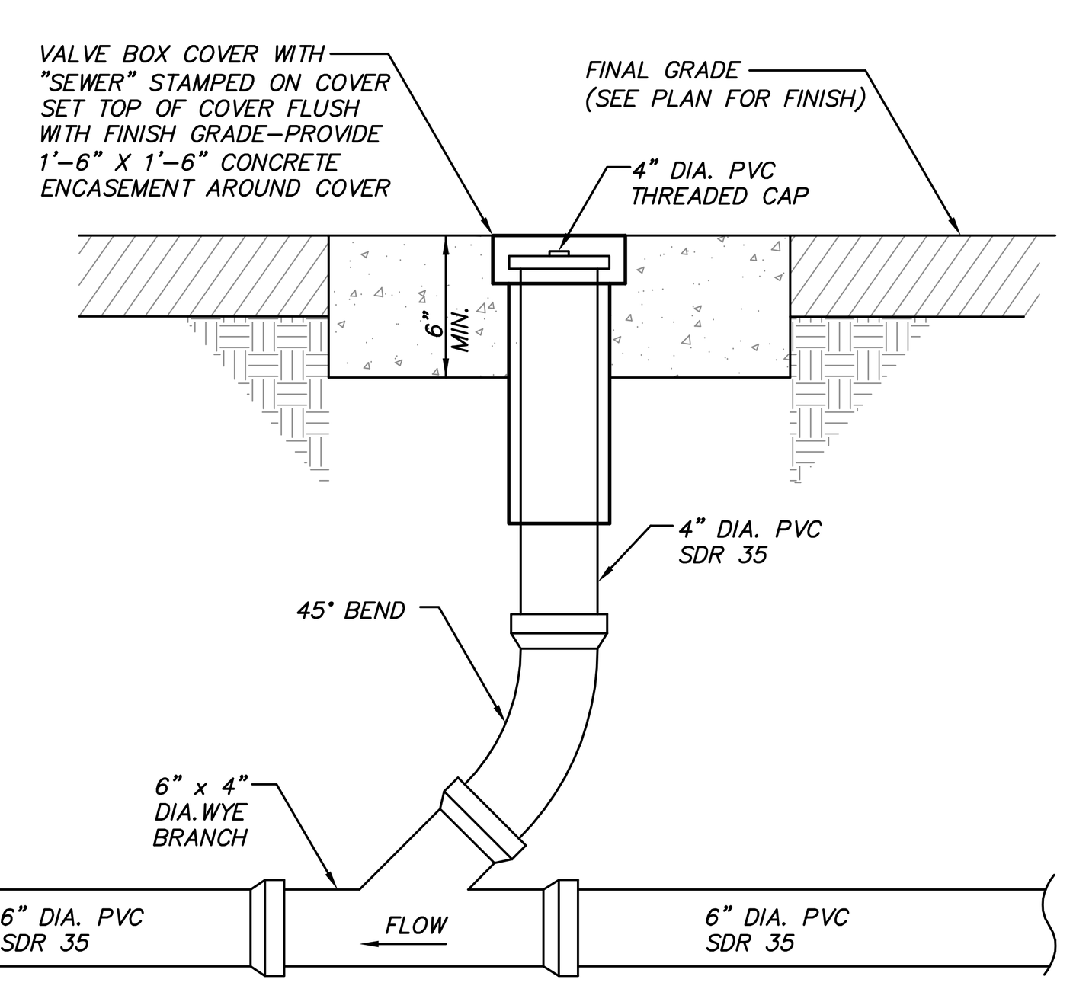
EXTERNAL DROP MANHOLE DETAIL

(N.T.S.)



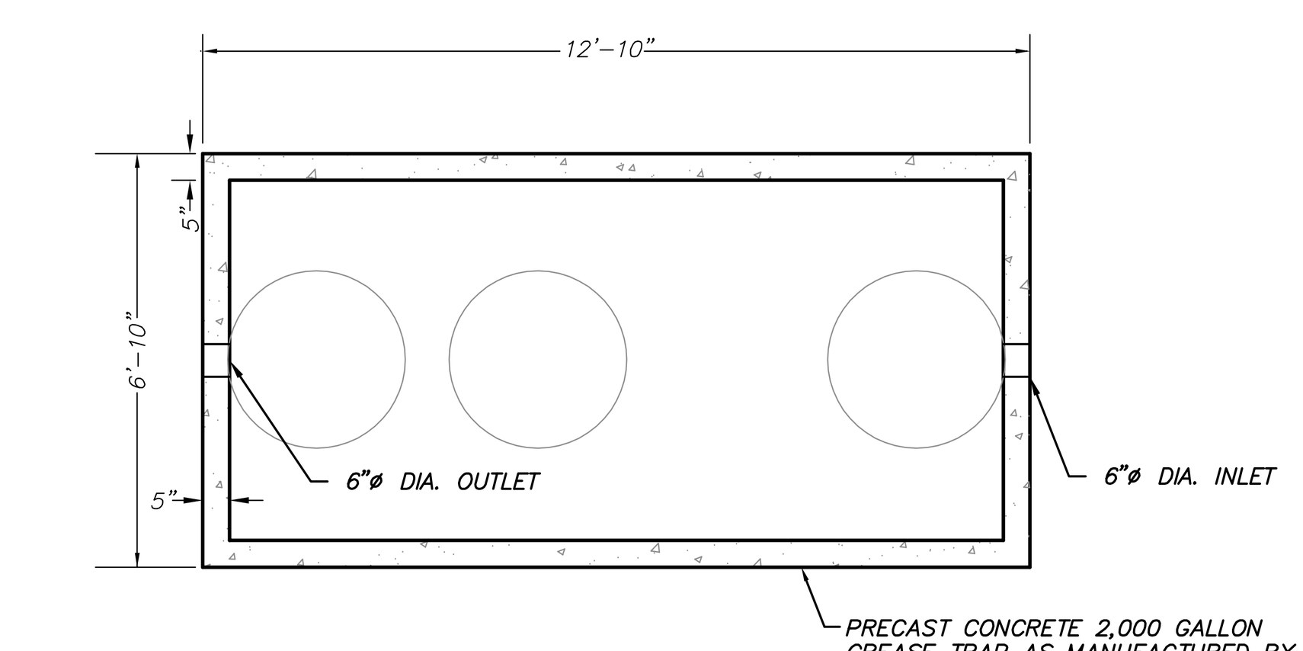
TYPICAL MANHOLE TROUGH DETAIL

(N.T.S.)

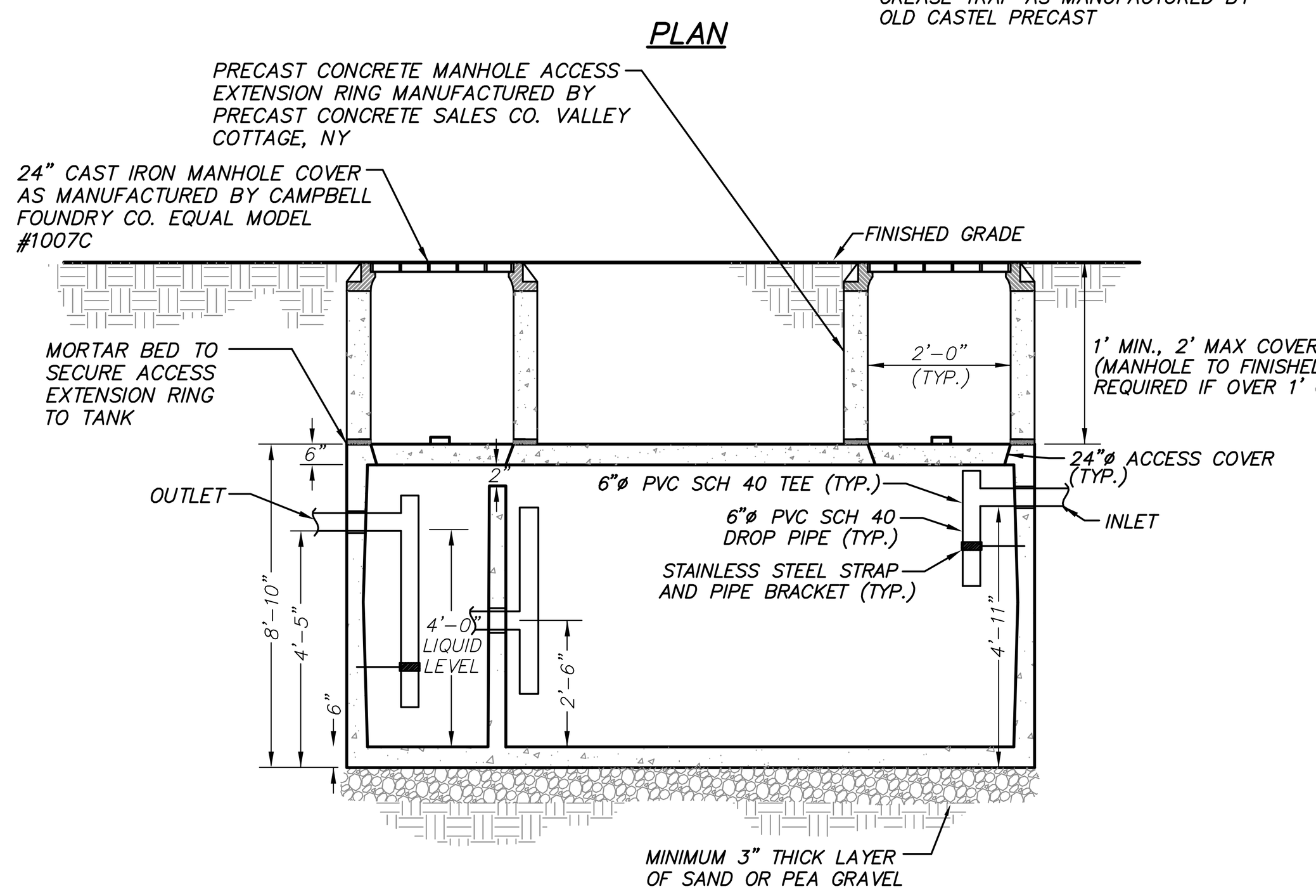


SEWER LINE CLEANOUT DETAIL

(N.T.S.)



PLAN

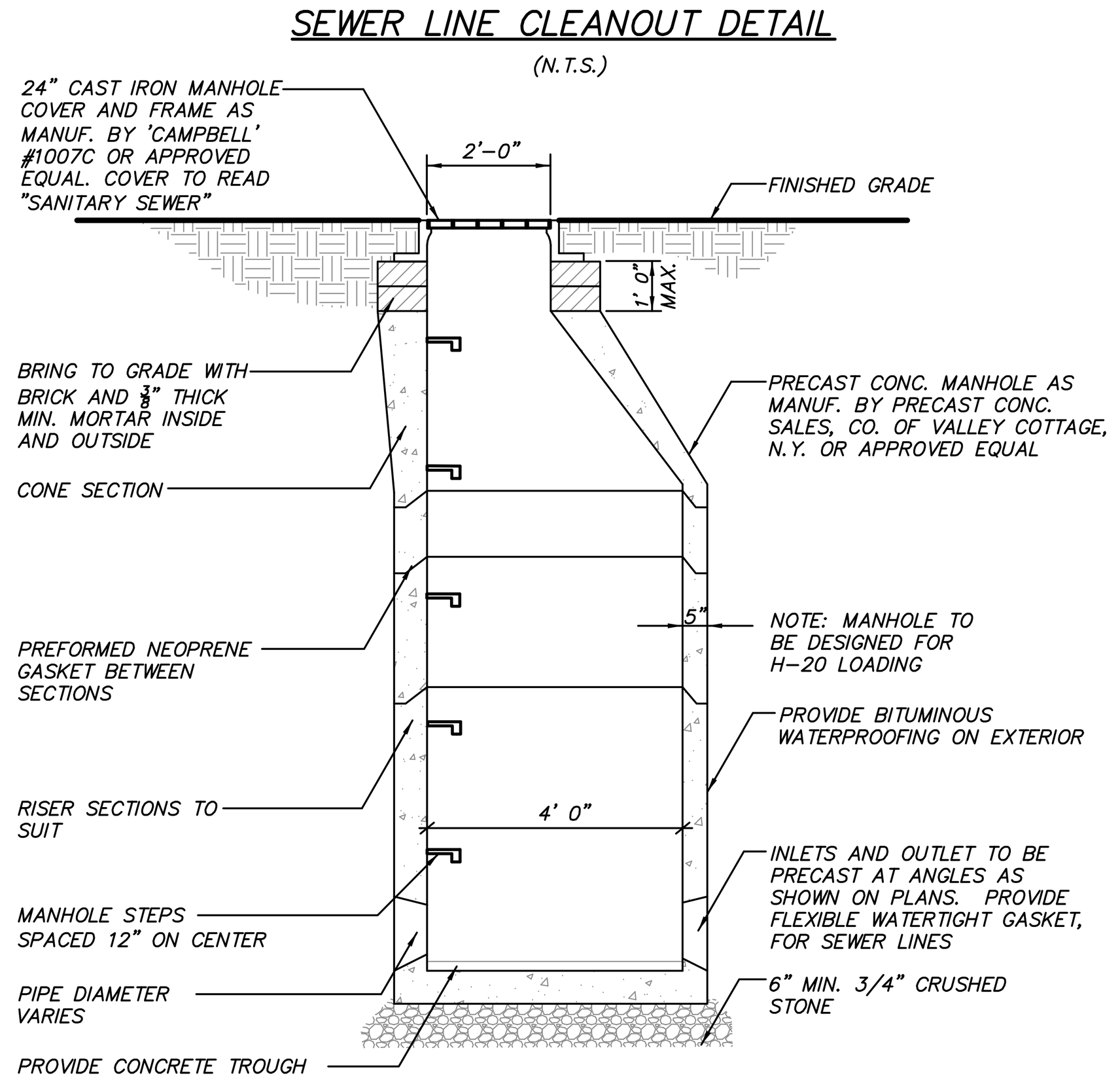


SECTION

2,000 GALLON GREASE INTERCEPTOR DETAIL

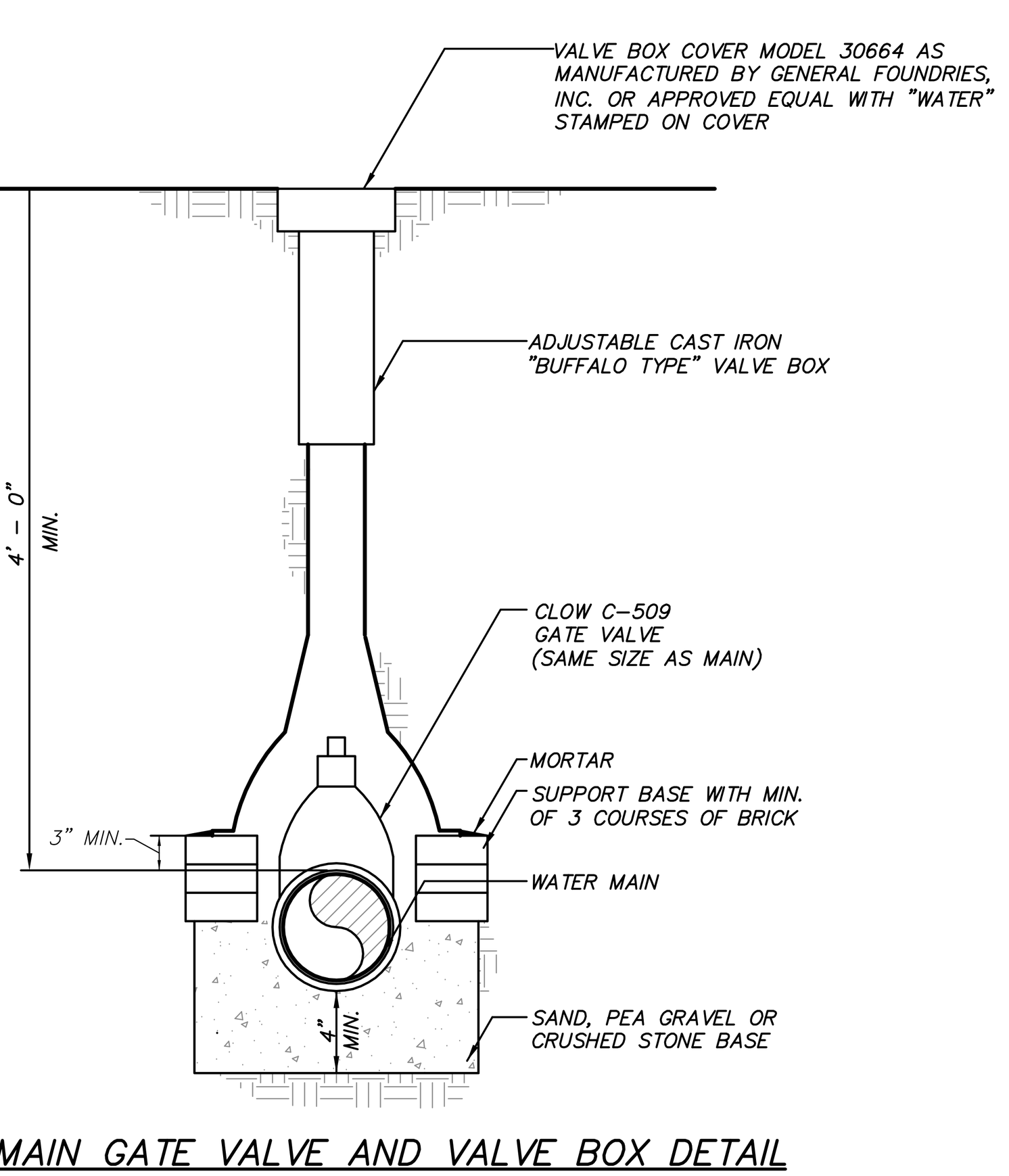
(TO BE DESIGNED FOR H–20 LOADING WHEN IN PAVEMENT)

(N.T.S.)



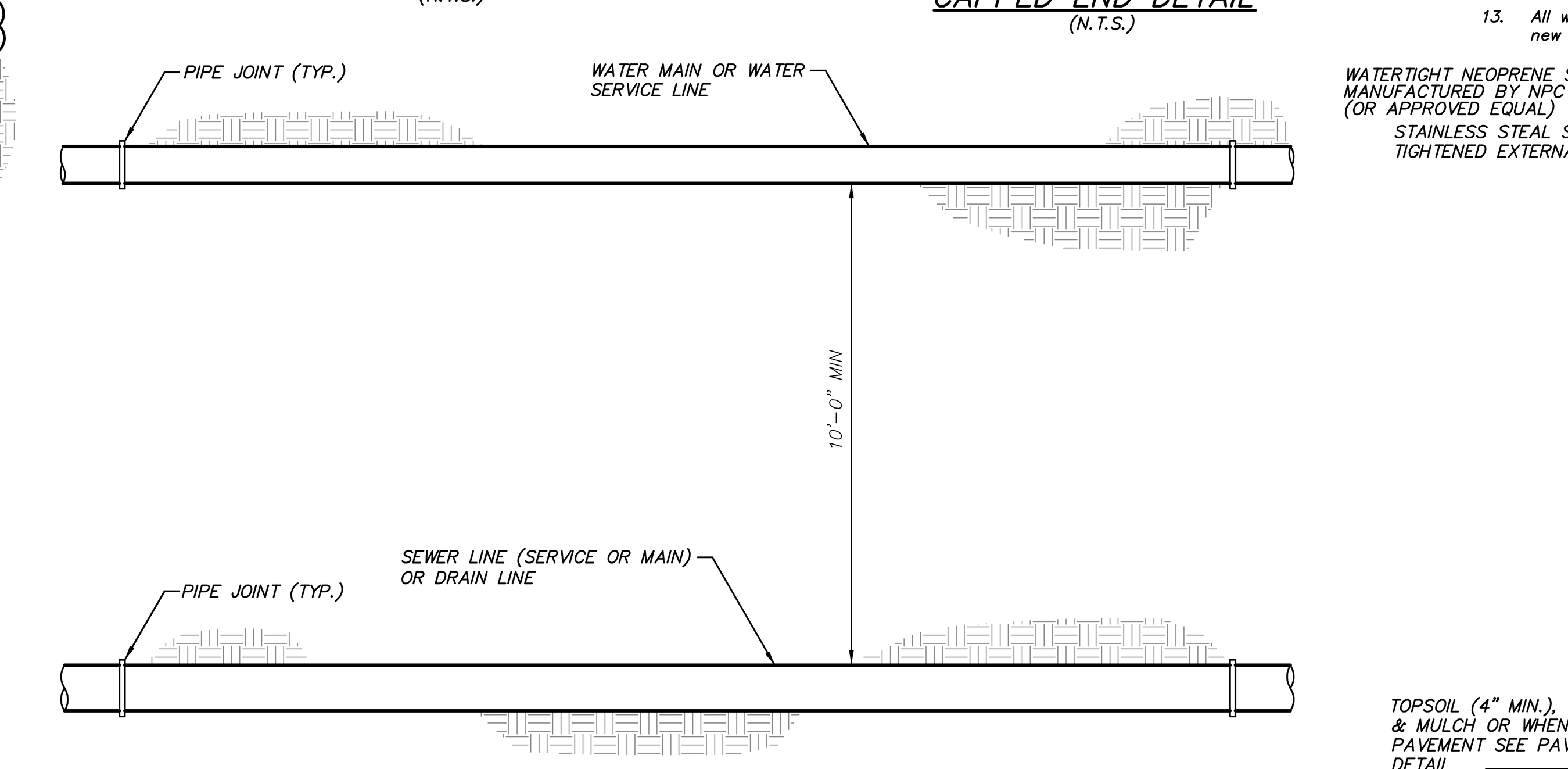
SEWER MANHOLE DETAIL

(N.T.S.)



WATER MAIN GATE VALVE AND VALVE BOX DETAIL

(N.T.S.)

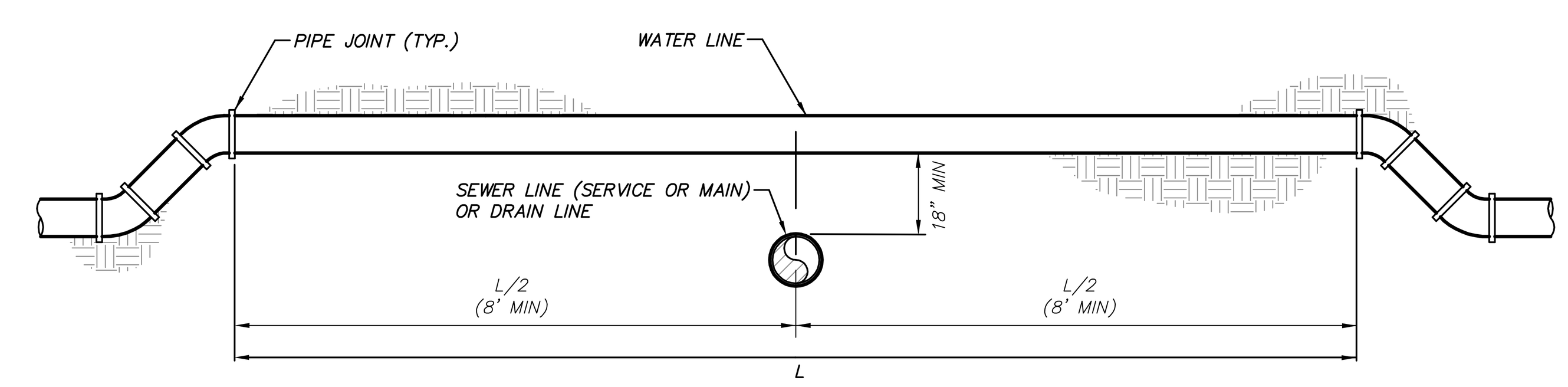


NOTES:

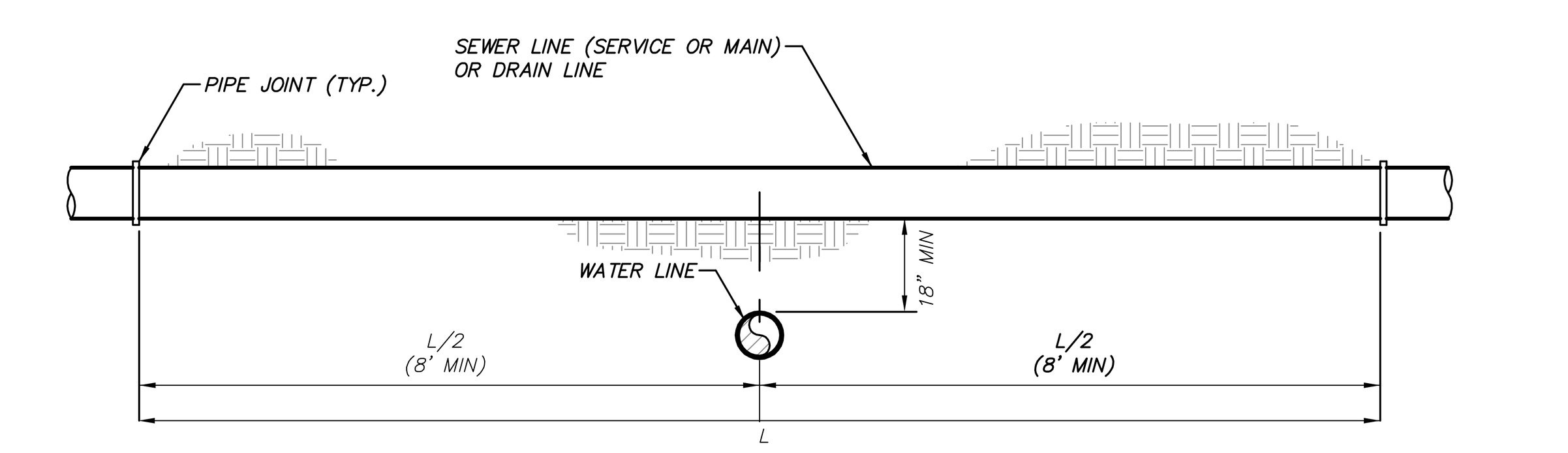
1. WHEN THE 10' SEPARATION CANNOT BE MAINTAINED, THE WATER LINE SHALL BE ENCASED IN CONCRETE (SEE DETAIL) ONLY WITH PRIOR APPROVAL OF THE MUNICIPAL ENGINEER AND DEPARTMENT OF HEALTH.
2. THE 10' SEPARATION APPLIES TO WATER MAINS AND WATER SERVICE CONNECTIONS.

WATER LINE HORIZONTAL SEPARATION DETAIL

(N.T.S.)



WATER LINE CROSSING OVER SANITARY SEWER LINE OR STORM DRAIN LINE



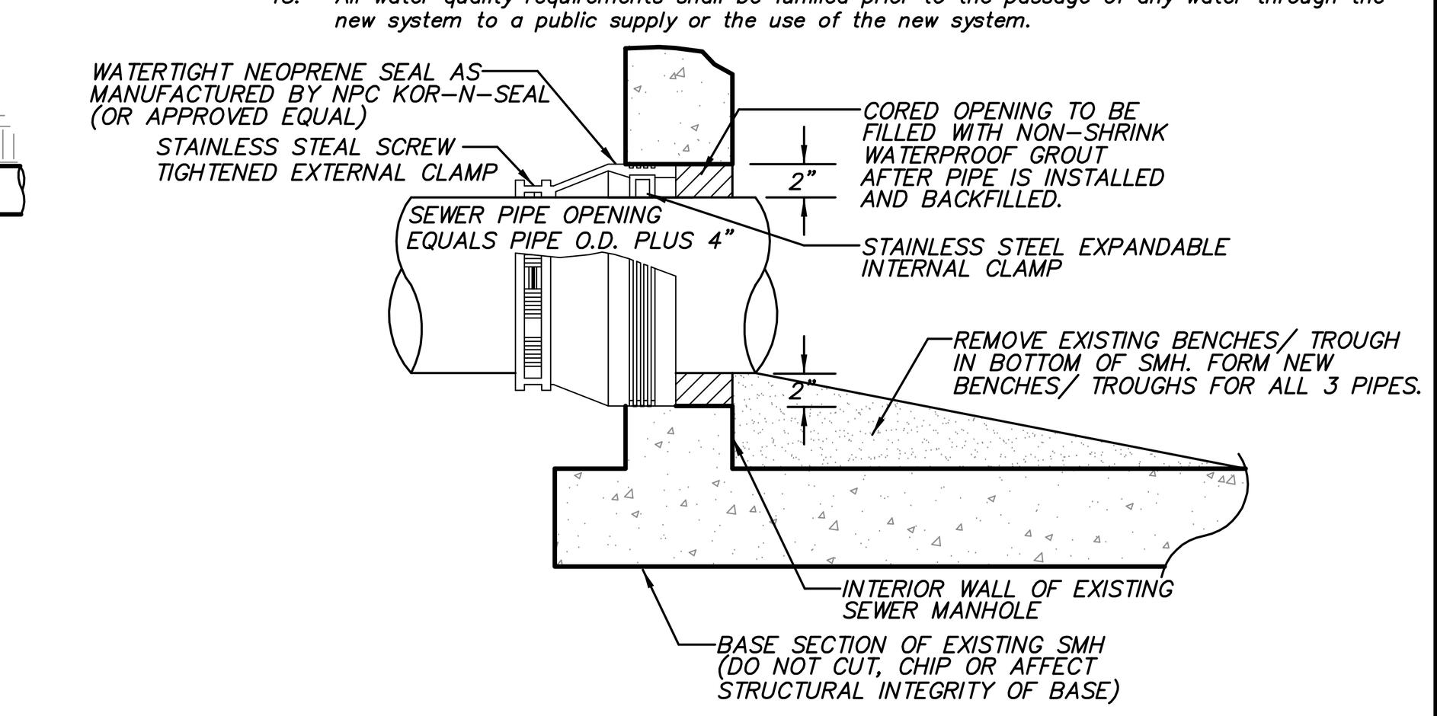
WATER LINE CROSSING UNDER SANITARY SEWER LINE OR STORM DRAIN LINE

NOTES:

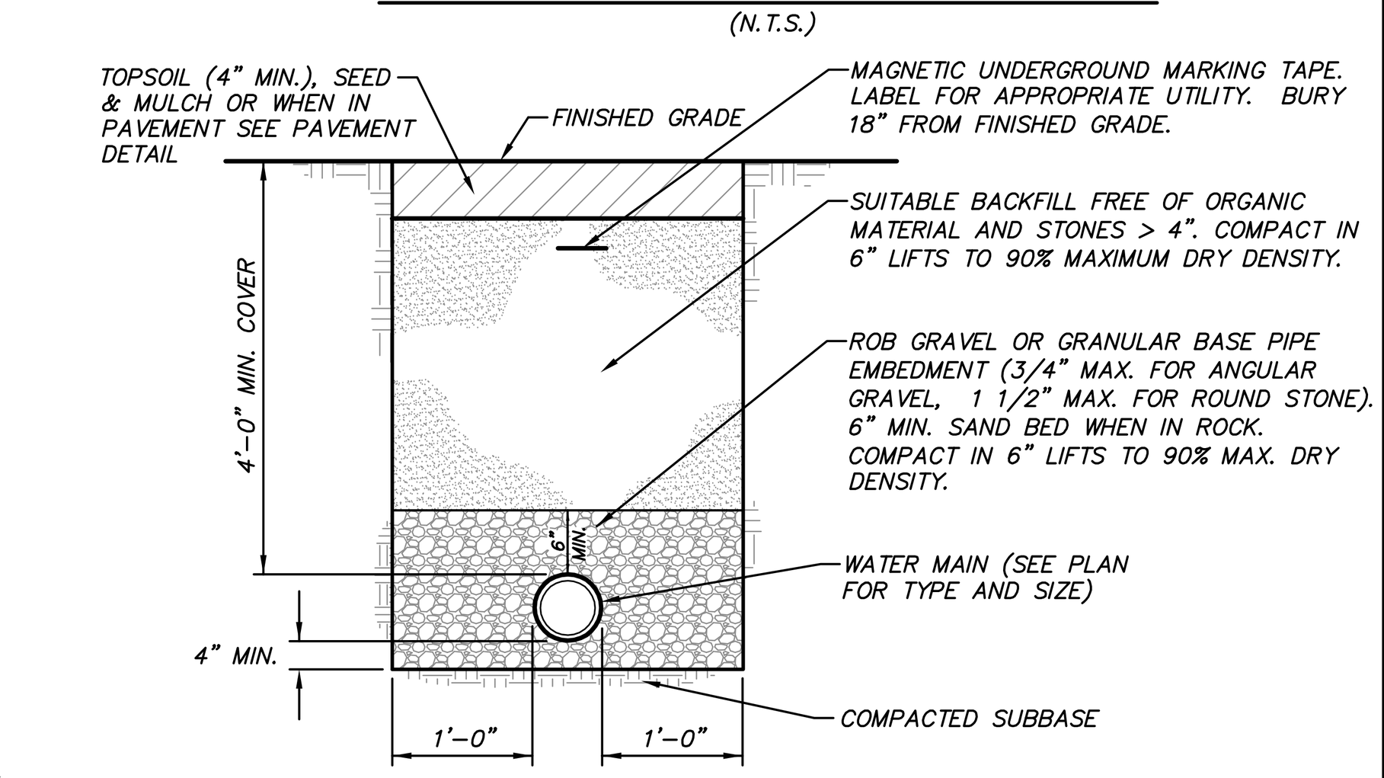
1. WHEN 18" SEPARATION CANNOT BE MAINTAINED, THE WATER LINE SHALL BE ENCASED IN CONCRETE (SEE DETAIL) ONLY WITH PRIOR APPROVAL OF THE DESIGN ENGINEER AND DEPARTMENT OF HEALTH.
2. PROVIDE PIPE AND FITTING RESTRAINT AS REQUIRED.
3. THE 18" SEPARATION APPLIES TO WATER MAINS AND WATER SERVICE CONNECTIONS.

WATER LINE CROSSING DETAIL

(N.T.S.)



PROPOSED SEWER CONNECTION TO EXISTING SEWER MANHOLE DETAIL



WATER MAIN TRENCH DETAIL

(N.T.S.)

INSITE ENGINEERING, SURVEYING & LANDSCAPE ARCHITECTURE, P.C.
3 Garrett Place
Carmel, NY 10512
(845) 225–9690
(845) 225–9717 fax
www.insite–eng.com

PROJECT:

ARTIS SENIOR LIVING OF TARRYTOWN

153 WHITE PLAINS ROAD, VILLAGE OF TARRYTOWN, WESTCHESTER COUNTY, NEW YORK

DRAWING:

DETAILS

PROJECT NUMBER	17200.100	PROJECT MANAGER	R.D.W.	DRAWING NO.	SHEET
DATE	1–28–19	DRAWN BY	A.K.M	D–3	11 / 12
SCALE	AS NOTED	CHECKED			