SECTION 6

SPECIFICATIONS FOR SANITARY SEWER

6.01 DESCRIPTION OF WORK

The work consists of furnishing and installing sanitary sewer pipe of the specified sizes in a trench and includes the construction of manholes, lateral connections to adjacent properties and other appurtenant work. Excavating, Trenching, and Backfilling must be as specified in Section 2 of the Georgetown Township Standard Specifications.

The work must be performed in accordance with the Project Specifications and Drawings, the MDOT 2020 Standard Specifications for Construction and the following specifications.

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

6.02 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.

6.02.01 Sewer Pipe

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

6.02.01.01 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 26 (SDR-26).

PVC solid-wall pipe 18 inches in diameter and larger must conform to the requirements of ASTM F679, with a minimum pipe stiffness of 115 psi (PS-115).

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

Color of the pipe must be green or white.

6.02.01.02 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.

Color of the pipe must be green or white.

6.02.01.03 Profile PVC Pipe

Profile PVC pipe may be used only when specifically approved by the Township.

When approved for use by the Township, Polyvinyl Chloride (PVC) Open Profile Pipe must conform to the requirements of ASTM Designation F949/F794 and shall be Contech A-2000 or approved equal. Pipe must have a minimum pipe stiffness of 46 psi (PS-46).

When approved for use by the Township, Polyvinyl Chloride (PVC) Closed Profile Pipe must conform to the requirements of ASTM Designation F1803 and shall be Vylon or approved equal.

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

6.02.01.04 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.

6.02.02 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.

6.02.02.01 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 Township 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.

6" Inserta Tee, Kor-N-Tee, or approved equal, on main sewer of PVC Open Profile or Closed Profile sewers.

6.02.02.02 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.

6.02.03 Sanitary Sewer Laterals

6.02.03.01 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).

Lateral joints for lateral pipe must be solvent weld.

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

6.02.03.02 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.

Lateral joints for fittings must be solvent weld.

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

6.02.03.03 Lateral Couplings

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

6.02.03.04 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.

6.02.03.05 Lateral Cleanouts

Sanitary lateral cleanouts must be a screw type plug with a female adapter and raised plug. Lateral cleanouts must include castings. In non-paved areas shall include an EJ No. 1566Z Assembly. Paved areas shall include an EJ No. V8502 Assembly.

6.02.04 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.

6.02.04.01 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.

6.02.04.02 Masonry Sand

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

6.02.04.03 Water

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

6.02.05 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.

6.02.06 Manhole Materials

6.02.06.01 Adjusting Rings

Unless otherwise specified, adjusting rings must be precast and conform to the requirements of ASTM C478.

6.02.06.02 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.

Corrosion protection may be provided via a polymer concrete manhole or a bond welded PVC cast in place liner from Alternative Lining Technologies or approved equal.

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.

6.02.06.03 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 EJ No. 1045Z or approved equal. Casting cover must be EJ No. 1040AGS or approved equal.

Where indicated on the plans, pressure-tight manholes castings must be provided. Casting frame must be EJ No. 1045ZPT or approved equal. Casting cover must be EJ No. 1040APT or approved equal. Within unimproved areas, pressure-tight casting frames must be anchored to the manhole per the standard details.

Cover must be labelled “SANITARY SEWER” and be imprinted with the letter G.T. logo.

6.02.06.04 Manhole Encapsulation

When indicated by the Township, the casting frame, adjusting rings, and a minimum 4 inches of the top section of all manholes must be wrapped with a heat activated, high shrink, rubber-backed membrane to minimize infiltration into the manhole.

Material must be Infi-Shield External Uni-band Seal by Sealing Systems, Wrapid Seal by CANUSA-CPS, or approved equal.

6.02.06.05 Steel Reinforcement

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

6.02.06.06 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 and must include stainless steel bands.

6.02.06.07 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. Steps must be aligned vertically over the downstream outlet.

6.03 INSPECTION

6.03.01 Shop Inspection

All materials furnished by the Contractor are subject, at the discretion of the Township, 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 Township.

6.03.02 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.

6.03.03 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 Township. All defective materials furnished by the Contractor must be promptly removed from the site. Any material furnished by the Township and found defective will be set aside and removed from the site of the work by the Township.

6.04 RESPONSIBILITY FOR MATERIAL

6.04.01 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.

6.04.02 Responsibility for Material Furnished by Township

The Contractor's responsibility for material furnished by the Township must begin at the point of its delivery to the Contractor. Materials already on the site must become the Contractor's responsibility on the day of the award of the contract. The Contractor must examine all material furnished by the Township at the time and place of delivery to the Contractor and must reject all defective material. Any material furnished by the Township 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 Township. 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.

6.04.03 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.

6.04.04 Replacement of Damaged Material

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

6.05 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.

6.06 LAYING 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.

6.06.01 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 must place line and grade stakes at each manhole and at 25-feet, 50-feet, 100-feet, and 100-feet points thereafter to the next manhole or more often, as determined by the Township. The Contractor must check the line and grade at every point at which a stake has been placed and notify the Township where there is a grade discrepancy.

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

6.06.02 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.

Pipe must be protected during unloading and handling against impacts, shocks, and free fall. Pipe handled on skidways must not be skidded or rolled against pipe already on the ground.

6.06.03 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.

6.06.04 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.

Sufficient pressure must be applied by an approved method to each pipe as it is laid to ensure that the spigot is completely home in the bell. Care must be exercised to prevent joints from opening 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. All plastic/flexible pipe must be installed in accordance with ASTM D2321.

6.06.05 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.

6.06.06 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.

6.06.07 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 Township.

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.

6.07 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. Wyes and tees must be at minimum no closer than seven (7’) feet from the outside of a manhole structure.

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.

6.08 SANITARY SEWER LATERALS

6.08.01 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 details as shown on the Drawings.

6.08.02 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.

6.08.03 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.

In general, minimum depth of the lateral line shall be measured at the street right-of-way line or the easement line described as follows: laterals serving a standard house

with basement shall be 12 feet below first floor elevation; for a tri-level house, laterals shall be 4 feet below basement floor elevation; For houses with a walkout basement, laterals shall be 5 feet below basement floor elevation; and commercial buildings, schools, churches and other buildings shall be determined in the field by the Township.

An unimproved lot or parcel served by sanitary sewer shall be 10 feet below the centerline of the street unless otherwise directed by the Township. Easement areas will be as determined by the Township.

Where the sanitary sewer is more than twelve feet deep and minimum depth of the sanitary lateral at the right-of-way line or edge of easement can be maintained, a main line riser may be constructed in accordance with the standard details or as shown on the drawings. Backfill must be 6AA crushed stone and 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 (at a point approximately five (5) feet from the right-of-way line or easement line unless otherwise specified). The property line riser shall consist of a 6" sewer lateral pipe extended upward to a minimum of one (1) foot above the normal groundwater table, or to a depth provided from having a five (5) foot long (hypotenuse) riser whichever is the closest to finished grade. In all cases the lateral shall have a minimum of two (2) feet of cover.

After installation of the service lateral, but prior to backfilling, the Contractor must provide and install a 2" x 2" hardwood or 2” x 4” treated marker for each service. The wood markers must be set vertically from the end of the lateral to three (3) feet above finish surface elevations. The Contractor will assist the Construction Observer in locating the end of each lateral, and in recording the location by measuring to the nearest downstream manhole.

6.09 MANHOLE CONSTRUCTION

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

Unless specified otherwise, all manholes shall be precast.

Precast bases shall be installed on a minimum of 4 inches of pea gravel 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 or the Township.

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

½ 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 Township. 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. After the cover is brought to grade, the entire hole created by excavating to raise the casting shall be filled in per the detail on page 6-18. Special care must be taken to prevent debris from entering sewers. In aggregate areas, the casting shall be four to six inches (4" – 6") below finished grade with an 8-mil thick polyethylene sheet covering the casting before it is covered with aggregate. In non-pavement and lawn areas, the casting shall be brought up to finished grade.

6.10 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. No connections will be allowed that are 6" or more above the primary flow channel unless a drop connection is used. The inlet pipe slope must be revised so that the pipe enters within 6" from the primary flow channel or a drop connection is utilized.

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

6.11 ACCEPTANCE TESTS

6.11.01 Alignment and Grade

Each section of sewer may be checked by the Township for alignment and grade using lights and mirrors, television inspection, or other similar means. The Contractor must assist the Township 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 Township.

6.11.02 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 the requirements of the Township.

6.11.02.01 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 and the base course of the road is paved. The Township will not witness or accept any air test until the base course is paved with exception if the water table is above seven (7') feet over the pipe (see notes below). The Contractor is encouraged to perform an air test upon completion of the installation of the sewer and laterals and prior to restoration or installation of the utilities for their own benefit.

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. The gauge to be read during testing must at minimum be in increments of 0.5 pounds.

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 ($3.5 + 0.43*2 = 4.36$).

At no time must internal pressure exceed 9 psig.

TABLE 1

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	*

*In this situation, the Township will require at minimum two (2) air tests: one air test during the dewatering operations at 4.5 psig and one air test at the maximum of 6.5 psig when the road base course has been paved.

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 following this section. 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 Township 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.

6.11.02.02 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.

6.11.03 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 Township. Use of mechanical devices or equipment to complete the go/no go tests and vibratory rerounding of failed sections are prohibited. Deflection testing may not occur until both a minimum of thirty (30) days must elapse between backfilling and base course has been placed.

6.11.04 Televising

After the pipe deflection test, placement of base course (when the pipe is proposed under pavement), leakage tests, and pipe cleaning, the Contractor must conduct a continuous video recording inspection of all sanitary sewers. The inspection and documentation must meetthe 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. In addition, televising shall not occur at the

same time as the sewer is being jetted and vacuumed out. Test balls shall not be left in during televising.

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 Township 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.

If the video indicates visible leaks, the Contractor shall be required to repair the leakage sections by removing and replacing pipe and/or sealing with grout as determined by the Township. The line shall then be re-televised at no additional cost to observe where the observed leaks were repaired.

6.12 RECORD DRAWINGS

See Sections 1.06, 1.08, and 1.12.07 for more information on record drawing submittal requirements. Below are the individual requirements for record drawings for all sanitary sewer construction. Records from the Contractor will be provided every Friday to the Township.

6.12.01 Connection to Existing Sanitary Sewer

Details will be required for connecting into the existing sanitary sewer.

6.12.02 Sanitary Laterals

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

For laterals, witnesses must be reported on the record drawing. The witnesses must be to both frontage property corners.

6.12.03 Sanitary Sewer

Type of pipe and a list of materials must be reported on the record drawings. Clearances between utilities must also be reported on the record drawings. Length of the main manhole to manhole will be required on the record drawings.

6.13 MEASUREMENT AND PAYMENT

6.13.01 General

All proposed construction will be measured for payment by the Township 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.

6.13.02 Sanitary Sewers

Measurement of the length of the sewer will be in lineal feet along the centerline 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.

6.13.03 Manholes

Manholes and Drop 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.

When corrosion protection is needed for existing manholes, this will be paid for separately in accordance with the units established in the Proposal. When called for on the drawings or in the project specifications for corrosion protection in new manholes, this will be paid for separately in accordance with the units established in the Proposal; if no Proposal item is provided, corrosion protection is considered included in the Proposal item for manholes.

6.13.04 Wyes or Tees

When a specific item is provided in the Proposal for Wyes or Tees the unit price bid will be the additional cost of furnishing and placing the wye or tee over and above the cost of furnishing and laying the sewer pipe.

When no Proposal item is provided, the wyes or tees and their installation are considered part of the major items of work.

6.13.05 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 excluding fittings and mainline/property line risers.

6.13.06 Cut-Ins

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

6.13.07 Stubs

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

6.13.08 Risers

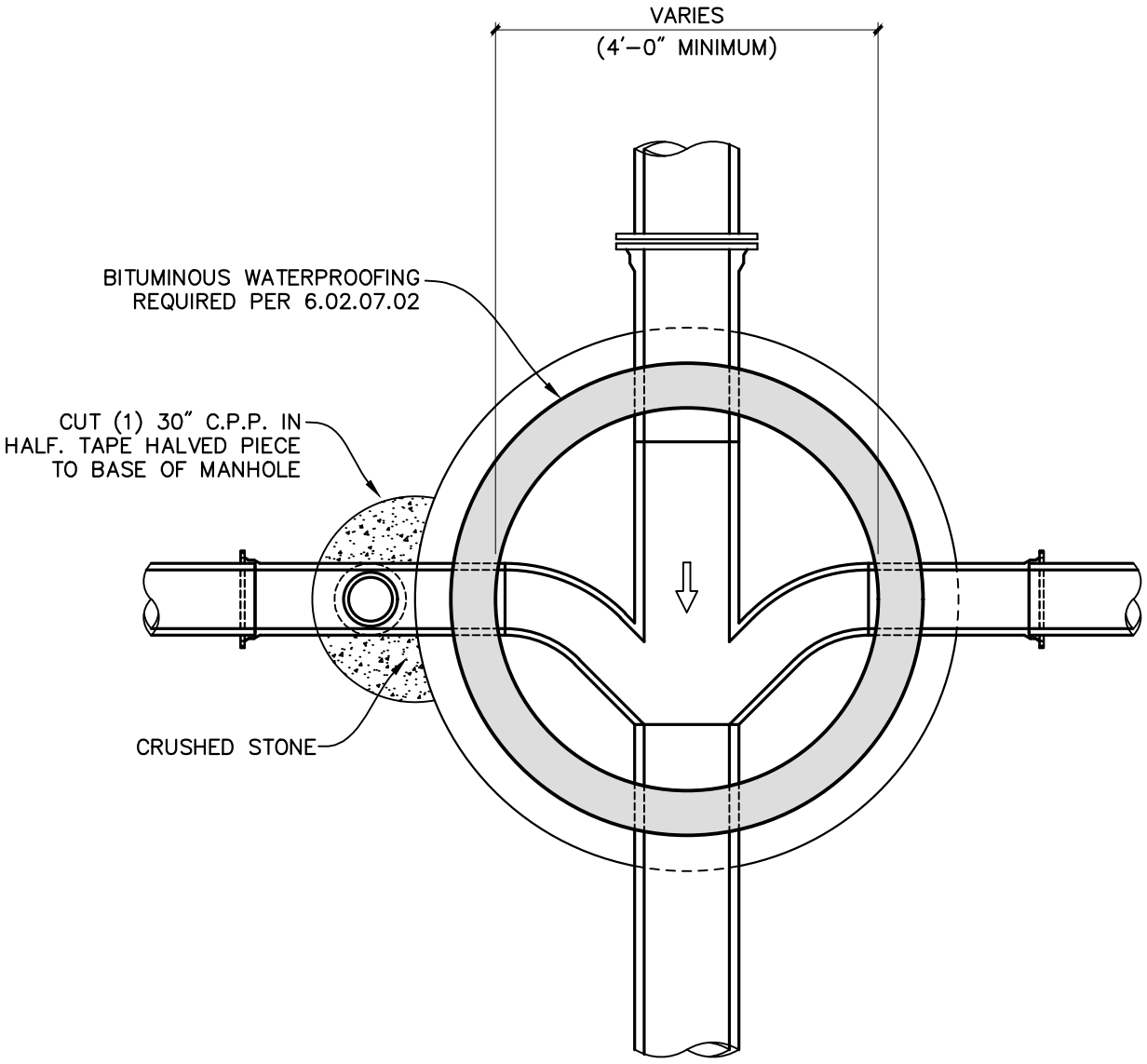
The length of main line risers shall be measured vertically from the top of the main sewer to the end of the riser. The length of property line risers shall be measured per unit from the lower bend for the riser to the end of the riser. When no Proposal item is provided, the risers and their installation shall be considered part of the major items of work.

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
6	5:40	398	0.854 L	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.

$$\text{Time} = \frac{\text{Length 1} \times \text{Time1} + \text{Length 2} \times \text{Time 2}}{\text{Length 1} + \text{Length 2}}$$



PLAN VIEW

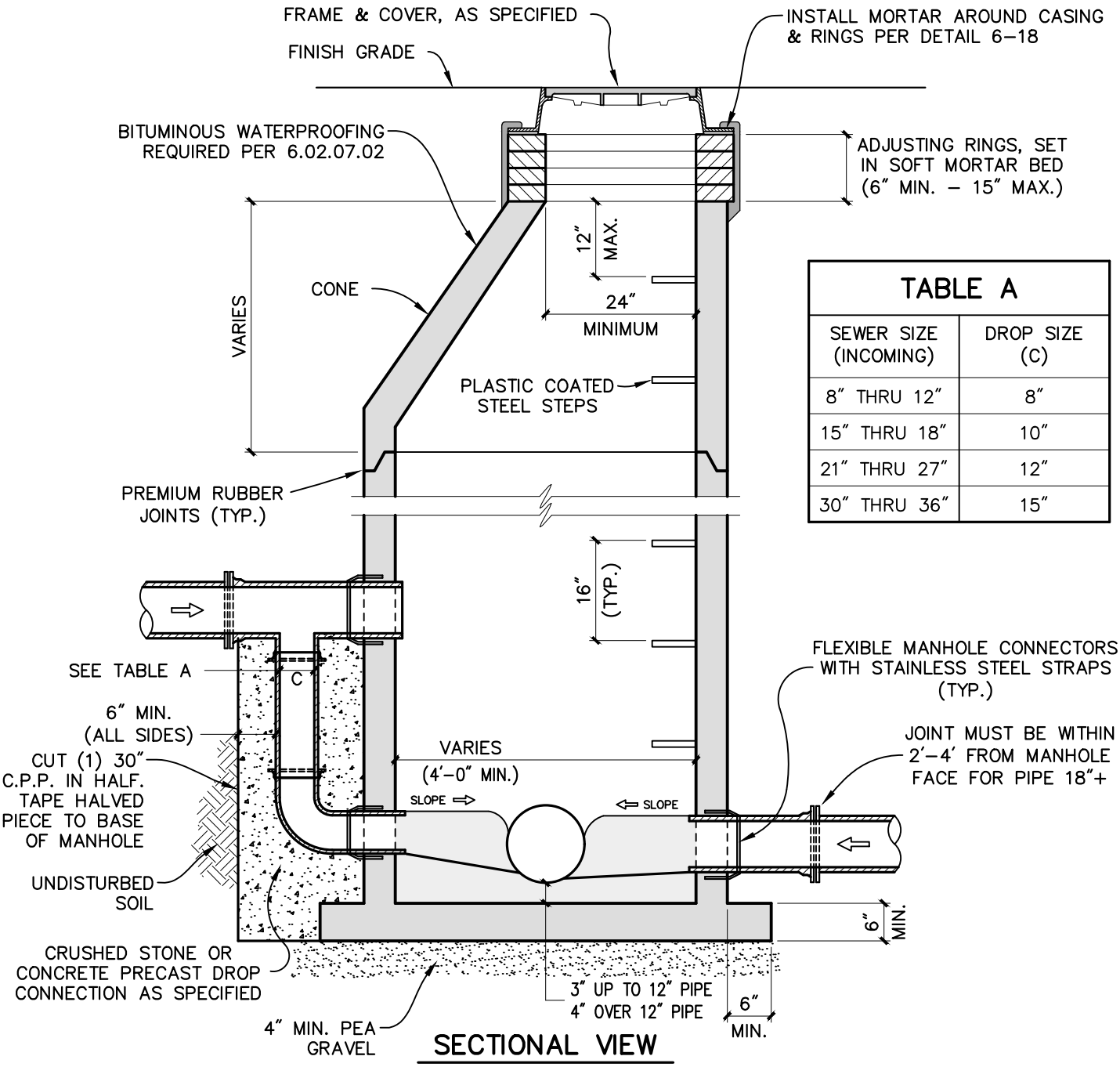
STANDARD SANITARY SEWER DROP MANHOLE

(PRECAST CONCRETE)

SCALE : NONE

NOTES

1. IF BOTTOM IS PRECAST CONCRETE, SET ON MINIMUM 4" PEA GRAVEL (CIP) WRAPPED WITH GEOTEXTILE FABRIC..
2. MANHOLE STEPS SHALL BE ALIGNED VERTICALLY OVER THE DOWNSTREAM OUTLET.
3. FLOW CHANNEL WALL HEIGHT SHALL BE EQUAL TO CROWN OF PIPE.



SECTIONAL VIEW

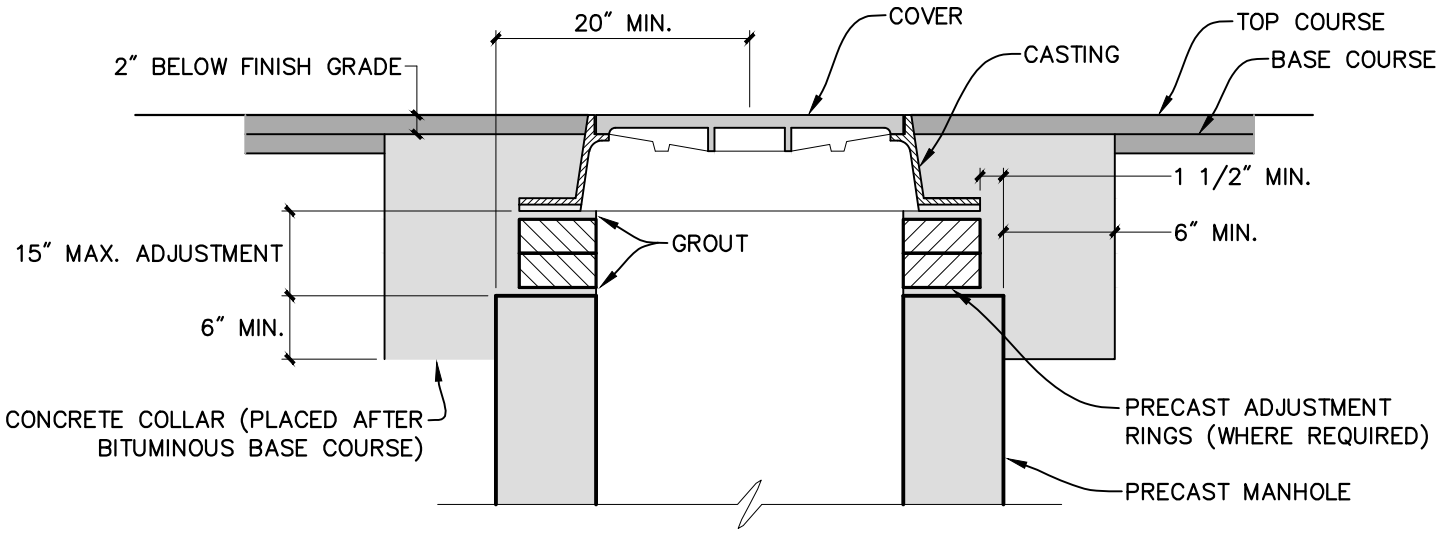
TABLE A	
SEWER SIZE (INCOMING)	DROP SIZE (C)
8" THRU 12"	8"
15" THRU 18"	10"
21" THRU 27"	12"
30" THRU 36"	15"

STANDARD SANITARY SEWER MANHOLE

(PRECAST CONCRETE)

NOTES

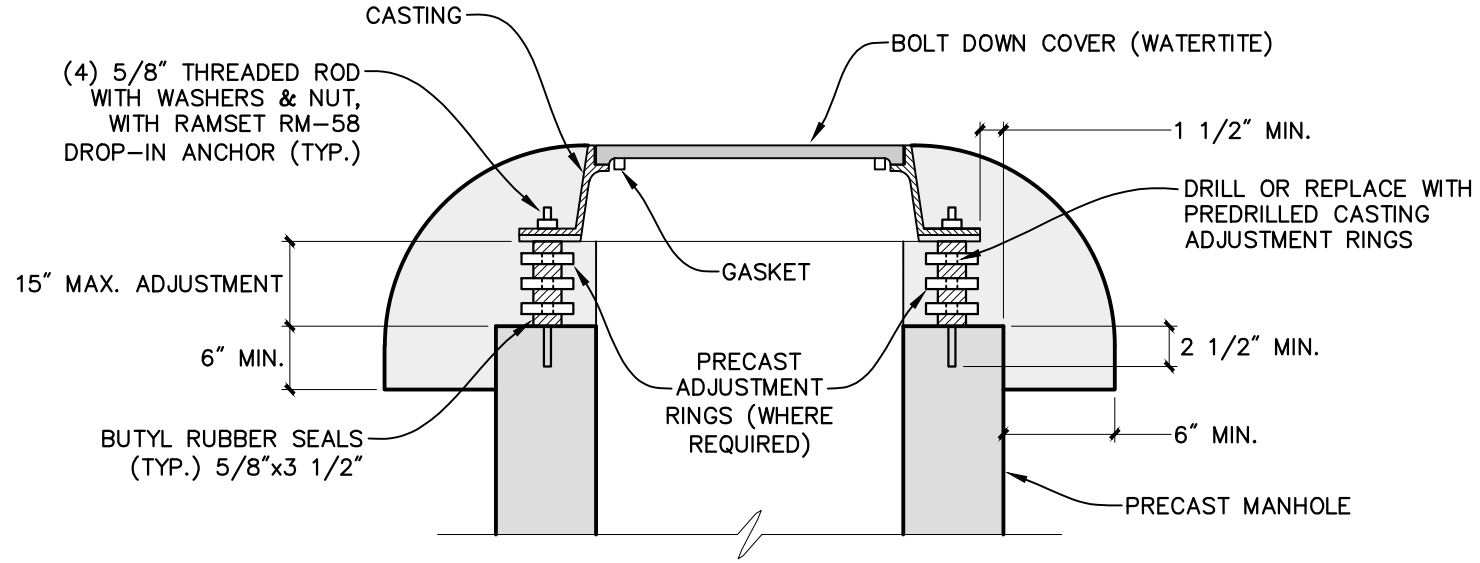
1. PRECAST CONCRETE MANHOLE MUST MEET ASTM C478.
2. SET ON MINIMUM 4" SAND SUBBASE (CIP) OR CLASS 1A CRUSHED STONE WRAPPED IN NON–WOVEN GEOTEXTILE FABRIC.
3. CONE MAY BE ROTATED TO ALIGN STEPS TO VARIOUS LOCATIONS IN MANHOLE.
4. FLOW CHANNEL WALL HEIGHT SHALL BE EQUAL TO CROWN OF PIPE.



CASE I : MANHOLE IN ROADWAY

NOTE

WRAPIDSEAL BY CANUSA–CPS, INFI–SHIELD EXTERNAL UNI–BAND BY SEALING SYSTEMS PER MFG. SPEC. OR APPROVED EQUAL SHALL BE USED IN LIEU OF MORTAR AS DESIGNATED BY THE TOWNSHIP.



CASE II : MANHOLE IN EASEMENT–OUTSIDE OF ROADWAY

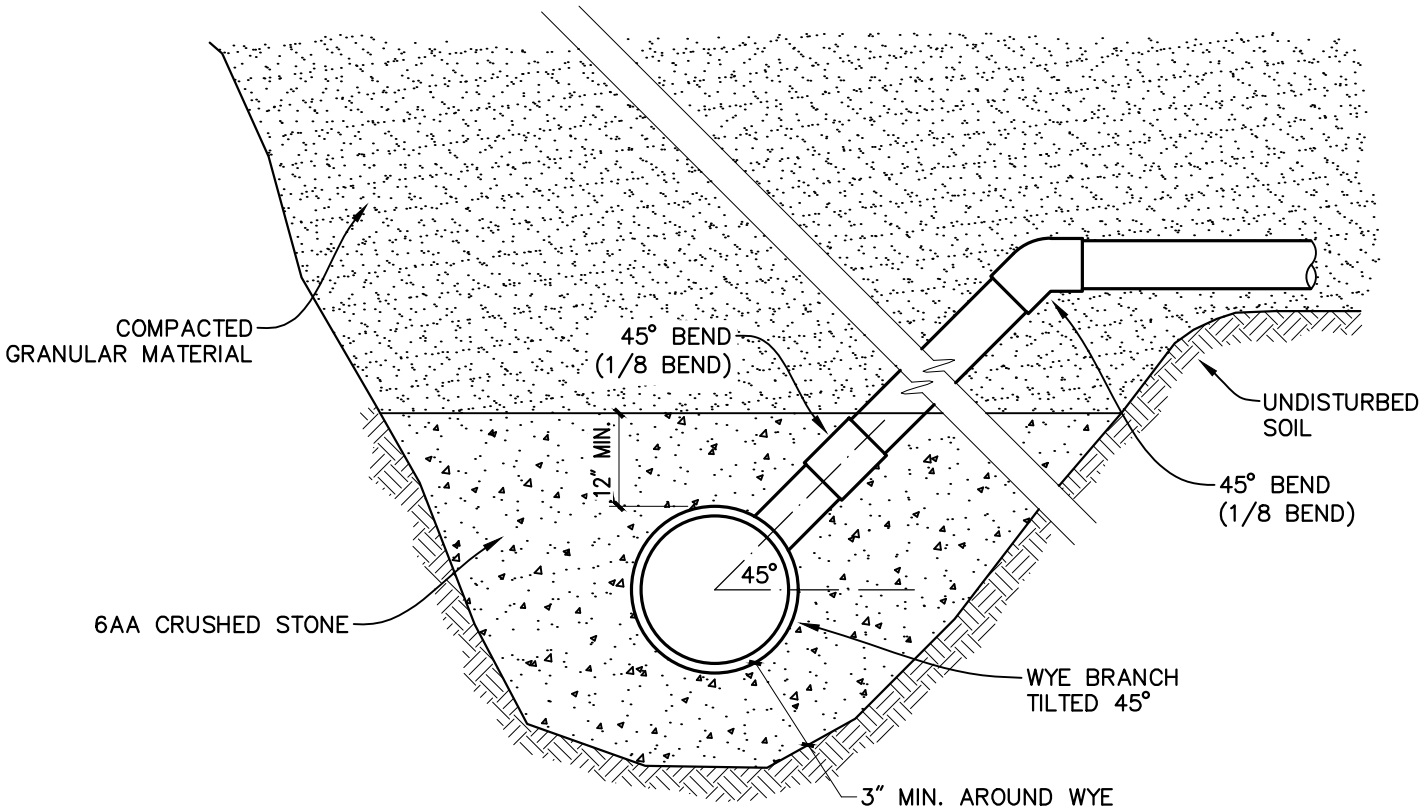
BOLT DOWN CASTING WITH RUBBER GASKET SEAL

NOTE

WRAPIDSEAL BY CANUSA–CPS, INFI–SHIELD EXTERNAL UNI–BAND BY SEALING SYSTEMS PER MFG. SPEC. OR APPROVED EQUAL SHALL BE USED IN LIEU OF MORTAR AS DESIGNATED BY THE TOWNSHIP.

STANDARD SANITARY SEWER CASTING DETAILS

SCALE : NONE



SLOPING TRENCH

(STANDARD)

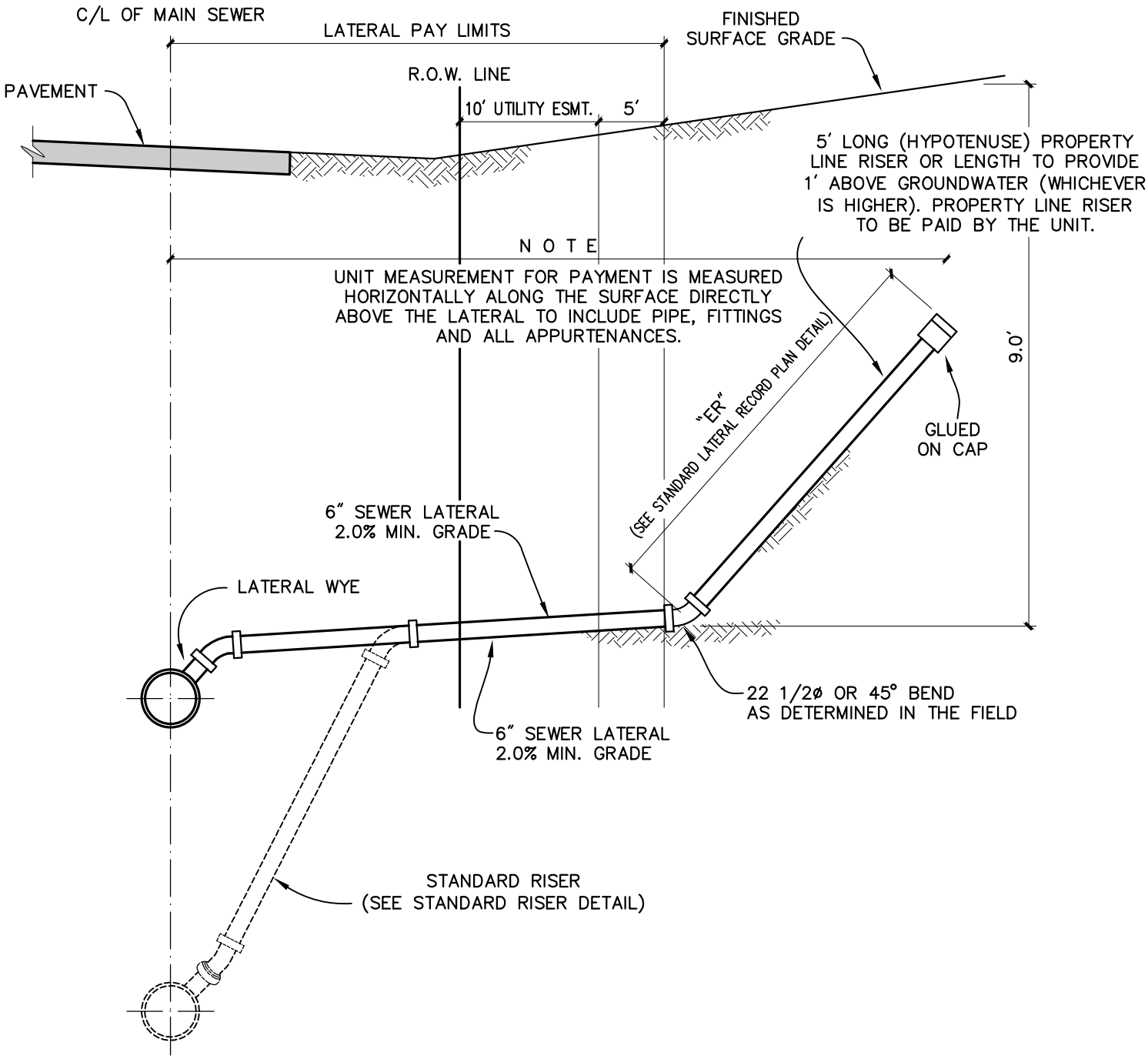
STANDARD RISER DETAILS

(SEWERS OVER 12 FEET DEEP)

SCALE : NONE

NOTES

1. MAIN LINE RISER SHALL NOT BE VERTICAL.
2. SEE PLANS OR SPECS FOR SIZE AND DEPTH OF LATERAL

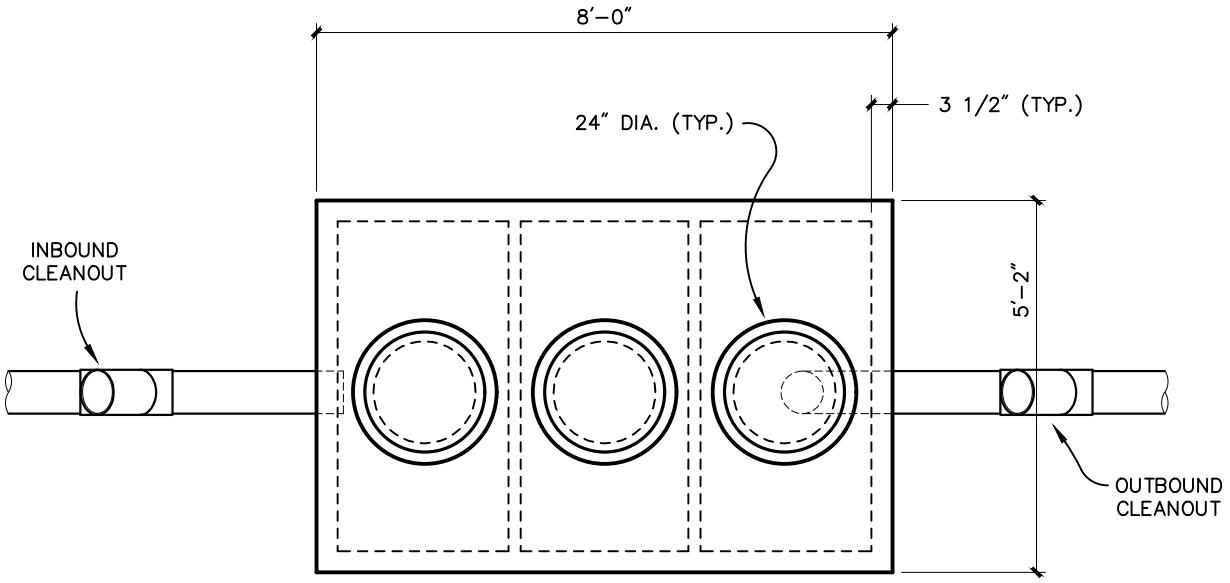


LATERAL AND PROPERTY LINE RISER DETAILS

SCALE : NONE

NOTE

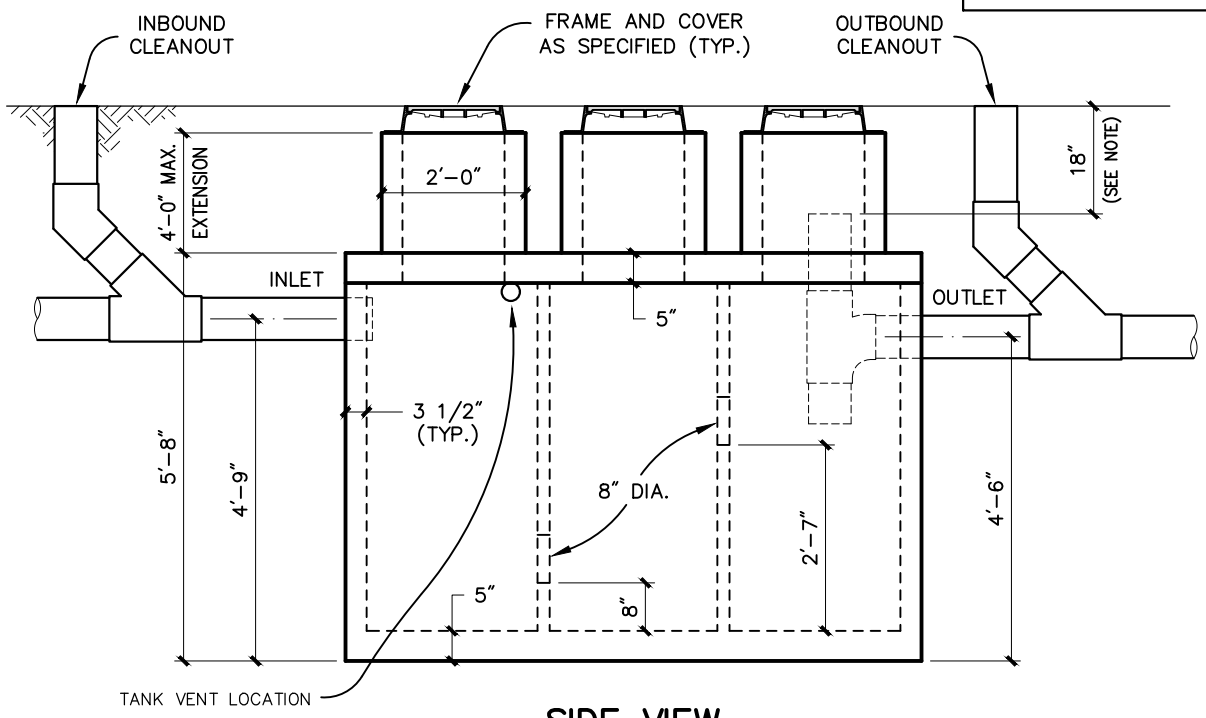
PROPERTY LINE RISER IS REQUIRED WHEN LATERAL IS IN WATER OR WHEN OTHERWISE SPECIFIED.



TOP VIEW

NOTE

DROP LEG ASSEMBLY RISER MUST BE BROUGHT UP TO WITHIN 18″ OF GRADE ELEVATION

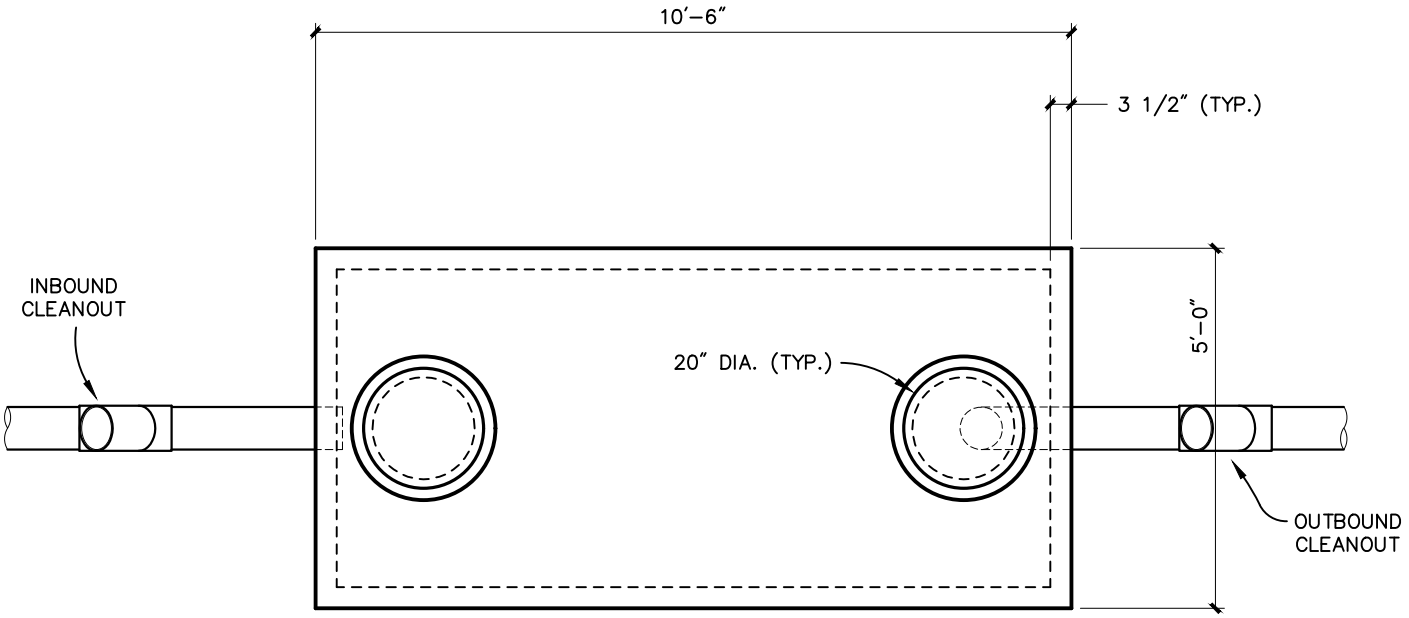


SIDE VIEW

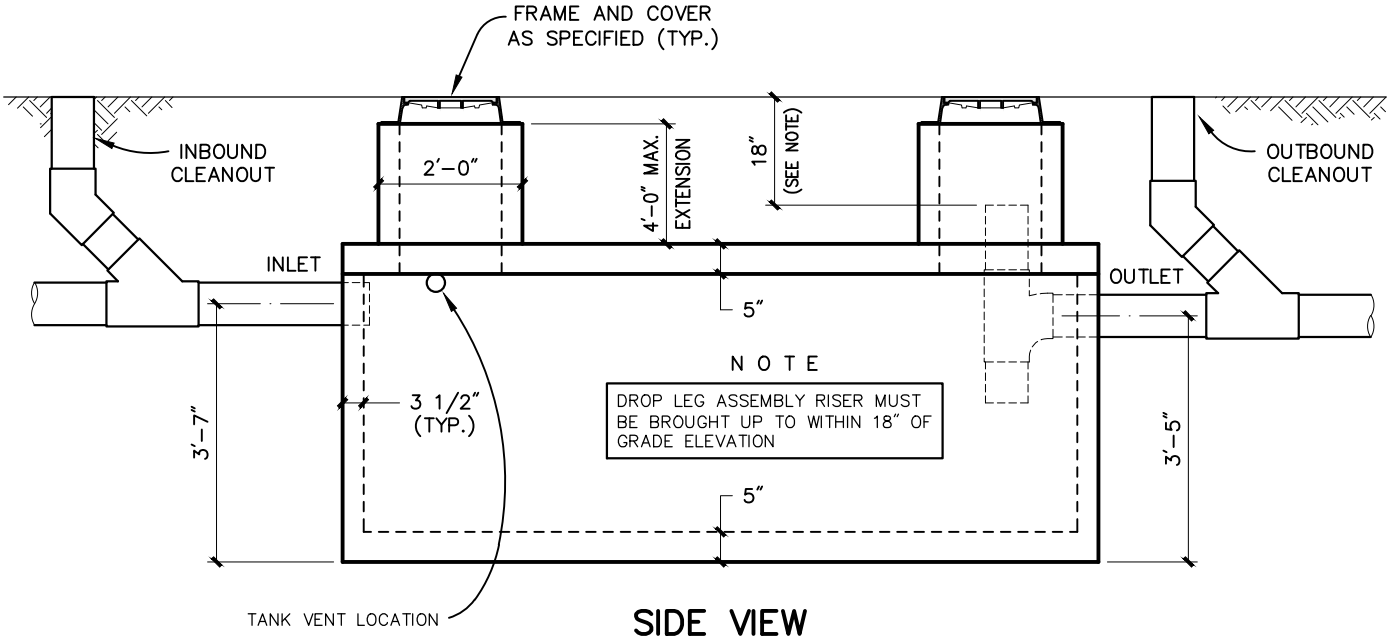
- ACCESS COVERS MUST BE RATED FOR ANTICIPATED TRAFFIC LOAD.
- SEAL BETWEEN TANK AND EXTENSIONS MUST BE WATER TIGHT.
- THE TANK JOINT MUST BE GASKETED AND ENCAPSULATED WITH WRAPIDSEAL OR INFI–SHIELD.
- THE TANK MUST HAVE A VENT ABOVE ALL TANK INVERTS AND MUST BE MADE WATER TIGHT.
- INBOUND AND OUTBOUND PIPES MUST HAVE BOOTED SEAL AT TANK OPENING.
- 18″ MINIMUM LENGTH ON OUTBOUND DROPLEG
- A SANITARY TEE MUST BE INCLUDED ON THE DROPLEG ASSEMBLY.

1,000 GALLON OUTDOOR GREASE INTERCEPTOR

SCALE : 3/8″ = 1′–0″



TOP VIEW



SIDE VIEW

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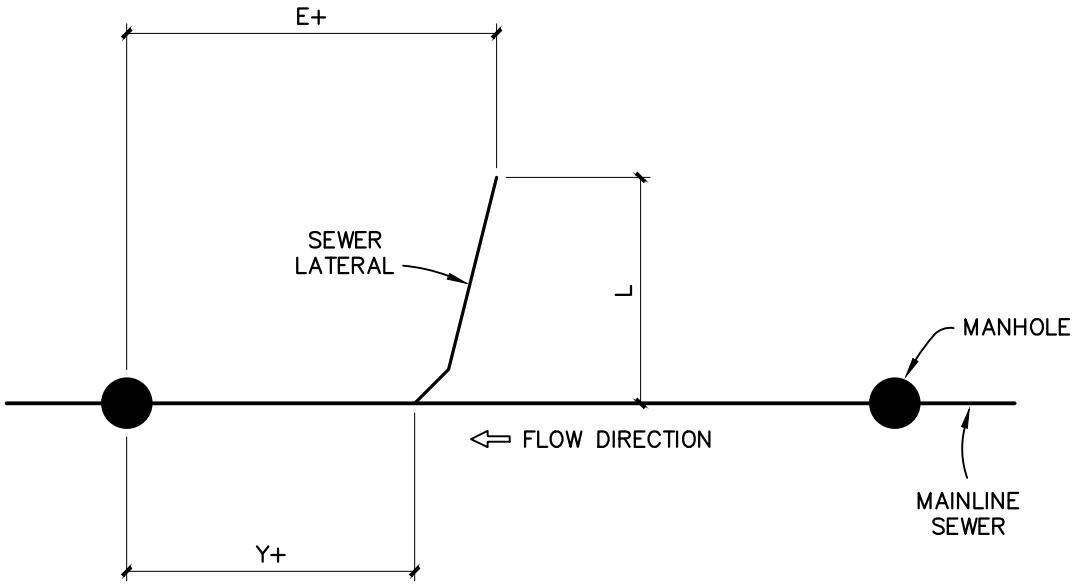
- INBOUND AND OUTBOUND PIPES MUST HAVE BOOTED SEAL AT TANK OPENING.
- 18″ MINIMUM LENGTH ON OUTBOUND DROPLEG
- A SANITARY TEE MUST BE INCLUDED ON THE DROPLEG ASSEMBLY.

1,000 GALLON OUTDOOR OIL & SAND SEPARATOR

SCALE : 3/8″ = 1′–0″

GCT
FEBRUARY 2025



STANDARD LATERAL RECORD PLAN DETAIL

Y+ =	DISTANCE TO WYE IN SEWER MAIN FROM DOWNSTREAM MANHOLE.
E+ =	DISTANCE ALONG SEWER MAIN FROM DOWNSTREAM MANHOLE TO A POINT WHERE THE END OF LATERAL IS AT 90 DEGREES TO THE SEWER MAIN.
L =	LENGTH FROM THE E+ LOCATION TO THE END OF THE LATERAL (I.E. DISTANCE FROM END OF LATERAL TO MAIN SEWER, MEASURED PERPENDICULAR TO MAIN SEWER). LENGTHS OF LATERALS (INCLUDING RISERS) ARE BASED ON HORIZONTAL MEASUREMENTS FROM THE CENTER OF THE SEWER MAIN.
ER =	LENGTH OF RISER THAT WAS INSTALLED ON THE END OF THE LATERAL. (SEE LATERAL AND PROPERTY LINE RISER DETAILS)
DEPTH =	INVERT ELEVATION AT END OF LATERAL OR AT CONNECTION TO EXISTING LATERAL. (SEE LATERAL AND PROPERTY LINE RISER DETAILS) RECORD ADDITIONAL INVERTS AT TOP AND BOTTOM OF RISERS.