

SECTION 6

SPECIFICATIONS FOR SANITARY SEWER

6.01 DESCRIPTION OF WORK

The Work shall consist of installing sanitary sewer pipe of the specified size or sizes in a trench and shall include the construction of manholes, lateral connections to the abutting property, and other appurtenant work. Excavating, trenching, and backfilling shall be as specified in Section 2.

6.02 MATERIALS

All materials furnished by the Contractor shall conform to the specifications which follow. Where reference specifications are used, they shall be considered as referring to the current edition or latest issue. Certified test reports for strength from the manufacturer shall be submitted to the Township when the pipe is delivered to the site.

6.02.01 Sewer Pipe

All sewer pipe shall be of the materials and strengths shown on the Plans and as specified.

6.02.01.01 Concrete Sewer Pipe (12" Diameter and Larger Only)

Nonreinforced concrete pipe shall conform to the requirements of ASTM Designation C-14, Class 3 or higher as determined by the Township.

Reinforced concrete sewer pipe shall conform to the requirements of the current specifications of the ASTM for reinforced concrete culvert, storm drain, and sewer pipe, Designation C-76 for the various classes specified.

Special lining for corrosion resistance maybe required as determined by the Township.

Joints for concrete sewer pipe shall be premium rubber joints conforming to the requirements of ASTM Designation C-443, except the infiltration and exfiltration allowance shall be as specified herein.

6.02.01.02 Polyvinyl Chloride (PVC) Solid-Wall Pipe

All PVC pipe shall conform to the requirements of ASTM Designation D- 3034, with a standard dimension ratio of 26 (SDR-26)

Joints shall be flexible elastomeric sealed type joint in accordance with ASTM D-3212.

6.02.01.03 Ductile Iron Pipe

Ductile iron pipe shall conform to the requirements of AWWA C-151 (ANSI A21.51), and shall be Class 53, unless otherwise specified. All pipe and fittings shall have Protecto 401 ceramic epoxy lining. Joints shall be rubber gasket joints conforming to the requirements of AWWA C-111 (ANSI A21.11). Joints on fittings shall be bolted mechanical joints.

Bolts shall be high strength, low alloy Cor-Blue steel bolts only conforming to ANSI/AWWA C111/A21-11. Bolt manufacturer's certification of compliance must accompany each shipment.

When laying ductile iron pipe in corrosive type soils, the pipe shall be encased in a seamless polyethylene tube in accordance with AWWA C105 (ANSI A21.5) of eight (8) mills minimum thickness. The ends of adjacent sections of polyethylene tubing shall be overlapped a minimum of one (1) foot, and the joint taped or otherwise secured to prevent displacement during backfill operations.

6.02.02 Sanitary Sewer Laterals (Public Right-of-Way)

All PVC sewer laterals and fittings shall be extra strength pipe, and unless otherwise specified, shall conform to the requirements of ASTM Designation D3034 with a standard dimension ratio of 23.5 (SDR 23.5), or conform to the requirements of ASTM Designation D-1785 Schedule 40. Any specified bends or curves shall be smooth, long-radius type curves. No mitered or segmental type bends will be approved.

6.02.03 Wyes and Tees

Wyes and Tees may be cast fittings of the same material and joints as the main sewer, or may be an approved fabricated special fitting which provides a suitable connection for the lateral to the main sewer.

Details of special fittings and/or adaptors for connection laterals of a material different than the main sewer shall be approved by the Township before they are manufactured.

Wye and Tees will be required as follows:

- 6" Wyes on main sewer of 8" or 10" diameter
- 6" Wyes or Tees on main sewer of 12" in diameter or larger.

6.02.04 Plugs and Stoppers

Plugs or stoppers for plugging the ends of laterals or risers which are not extended shall make a water tight seal and shall be of such a design that they can be readily removed without damage to the pipe.

6.02.05 Cement Mortar

Mortar shall consist of one part Air Entraining Portland Cement, and two parts masonry sand. These proportions shall be measured by volume.

Exposed mortar (castings in non-traffic areas) shall consist of Air Entraining Portland Cement, two parts masonry sand, and 1/4 part hydraulic cement.

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

6.02.05.01 Cement

Air Entraining Portland Cement shall conform to the requirements for Type 1A of the current MDOT Standard Specifications for Air Entraining Portland Cement, ASTM Designation C-175.

6.02.05.02 Masonry Sand

Masonry Sand shall conform to the requirements of "Natural Sand, 2 MS" of the current MDOT Standard Specification.

6.02.05.03 Water

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

6.02.06 Manhole Materials

6.02.06.01 Adjusting Rings

Precast grade adjusting rings shall conform to the requirements of ASTM Designation C-478.

The joints and/or joining surfaces of the adjustment rings shall be sealed with concrete as shown in the sewer casting detail. See standard sanitary sewer casting detail.

6.02.06.02.01 Precast Units

Unless otherwise specified, all manholes shall be precast. Manholes shall be cast wet. Dry cast manholes will not be permitted.

Precast reinforced concrete manhole risers and precast reinforced concrete manhole cone sections shall conform to the requirements for reinforced concrete manhole risers and tops, ASTM C-478.

Joints for precast sections shall be premium rubber, butyl rubber composition seals, “ramneck”, or approved equal.

6.02.06.02.02 Manholes with Corrosive Conditions

Where corrosive conditions due to septicity, forcemain connection, or other causes are anticipated, polymer concrete manholes shall be installed. Manholes shall be similar to Amitech Polyorete manhole or approved equal.

If a forcemain connection is to be made to an existing manhole, the manhole shall be lined with an OBIC spray on liner by Advanced Rehabilitation Technologies, a cured in place manhole liner as designed and manufactured by Alternative Lining Technologies, or approved equal.

The Township reserves the right to require lining additional manholes downstream from the force main connections as they deem necessary to prevent corrosion.

6.02.06.03 Castings

Castings shall meet the requirements specified in the 2020 Michigan Department of Transportation Standard Specifications Section 908. Manhole covers and rings and similar combinations of castings shall be machined to provide an even bearing.

Unless otherwise specified, manhole castings shall be East Jordan No. 1045 with 1040 solid cover stamped “Sewer”, or approved equal.

Where indicated on the Plans, water-tight manhole covers and castings shall be installed. Sealing or grouting shall be as shown on the standard manhole details.

6.02.06.04 Steel Reinforcement

Steel Reinforcement shall conform to the requirements for steel reinforcement of the 2020 MDOT Standard Specifications.

6.02.06.05 Flexible Manhole Connectors (Rubber Boots)

Flexible manhole connectors (also called rubber boots) shall 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” by A-lok Products, Inc., or approved equal. Flexible manhole connectors shall conform to the requirements of ASTM Designation C-923, Resilient Connectors.

6.02.06.06 Manhole Steps

Unless otherwise specified, manhole steps shall be plastic coated steel steps conforming to the requirements of ASTM Designation C-478, or approved equal, spaced at 16" center to center.

6.03 INSPECTION OF MATERIALS BY CONTRACTOR

It shall be the responsibility of the Contractor to inspect all materials for cracks, flaws, or other defects before they are incorporated into the Work. Any materials found to be defective or damaged shall be promptly removed from the job site.

6.04 LAYING PIPE

6.04.01 Alignment and Grade

6.04.01.01 Laser Alignment

The Contractor shall use the laser beam method of maintaining line and grade for sewer construction, unless otherwise approved by the Township. The Contractor shall submit evidence to the Township that a qualified operator will handle the laser beam equipment during the course of construction.

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

6.04.02 Handling

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

Pipe shall be carefully lowered into the trench in such a way as to avoid danger to the workers or damage to the pipe.

6.04.03 Direction of Laying

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

6.04.04 Placing

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

Sufficient pressure shall be applied by an approved method to each pipe as it is laid to insure that the spigot is completely home in the bell. Care shall be exercised to prevent joints from opening as successive lengths of pipe are placed. The Contractor shall take the necessary precautions when using a trench box to prevent joint separation when the box is pulled ahead.

6.04.05 Cleaning Sewer

The interior of the sewer shall be cleaned of all jointing material, dirt, and debris as the Work progresses.

In small sewers where cleaning after laying may be difficult, a swab or drag may be required in the pipe line to satisfactorily complete this Work.

The Contractor shall place and maintain a plug in the downstream end of the newly constructed sewer to minimize dirt and debris from entering the existing system. The plug shall be maintained by the Contractor until the newly constructed sewer has been accepted by the Township.

6.05 PIPE JOINTS

Pipe joints shall be made in strict accordance with the pipe manufacturer's recommendations unless otherwise specified herein. All lubricants, gaskets, and other materials required to make the joints shall be supplied or recommended by the pipe manufacturer and approved by the Township.

Pipe layers shall be fully qualified and experienced in the Work being performed and shall check each joint after it is completed to see that no part of the joint material is left on the inside of the pipe and that the joint is properly made.

6.06 LOCATION OF WYES AND TEES

The approximate locations of wyes or tees are shown on the Plans. These locations may be adjusted where necessary to best serve the various properties. Exact locations will be determined by the Township before the wyes or tees are installed.

The Contractor shall keep an accurate record of measurements from the nearest downstream manhole to each wye or tee which is installed. These measurements shall be recorded on the record Plans to be furnished by the Contractor.

6.07 SANITARY SEWER LATERALS

6.07.01 General

Installation of sanitary sewer laterals shall meet all requirements specified for sanitary sewers. All laterals shall be inspected by the Township before the trench is backfilled. Laterals shall not be connected to manholes.

6.07.02 Length

All sanitary sewer laterals shall be laid at right angles to the sanitary sewer mainline, and shall extend to a point one (1) foot outside the street right-of-way (property line) unless otherwise directed. No payment will be made for pipe laid beyond this point unless specifically ordered by the Owner.

The Contractor shall measure and record the horizontal length of the lateral from the main line sewer to the end of the lateral and provide this information to the Township.

6.07.03 Grade

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

The minimum grade on the lateral shall be two (2%) percent (1/4 in/ft.). Where minimum depths as specified herein cannot be obtained, minimum grades may be reduced to one (1%) percent (1/8 in/ft.).

Where the elevation of the end of the lateral to serve an existing building is not shown on the Plans, it shall be set at three (3) feet below basement grade for standard buildings (eleven (11) feet below first floor) or four (4) feet below basement grade for buildings with walkout basements (twelve (12) feet below first floor) where the set-back is fifty (50) feet or less.

In other cases the lateral may be set at two (2) feet below the basement elevation for standard buildings (three (3) feet for walkouts) plus an additional depth of two (2%) percent multiplied by the set-back distance to the building.

The minimum depth of the end of the lateral at the property line in all cases shall be 9'-0" below centerline of the street, excluding the property line risers.

6.07.04 Risers

Where the sanitary sewer is more than twelve (12) feet deep, a main line riser shall be constructed in accordance with the standard details or as shown on the plan. Backfill shall be carefully placed and compacted around the riser in an approved manner which will not damage the sewer or riser.

Property line risers shall be constructed on all laterals. Property line risers shall be constructed at the end of the lateral (at a point approximately five (5) feet from the right-of-way line unless otherwise specified). The property line riser shall consist of a six (6) inch sewer lateral pipe extended upward to a minimum of one (1) foot above the normal groundwater table, or to a depth of not less than four (4) feet below grade at the end, whichever is lower. (See Lateral and Property Line Riser Detail.)

6.07.05 Markers and Measurements

After installation of the service lateral, but prior to backfilling, the Contractor shall provide and install a 2" x 2" wood marker for each service. The wood markers shall be set vertically from the end of the lateral to twelve (12) inches above finish surface elevations. Also, a 1/2" diameter by 3' long metal stake shall be placed vertically and adjacent to the wood marker with six (6) inches of cover. The Contractor shall assist the Construction Observer in locating the end of each lateral, and in recording the location by measuring to the nearest downstream manhole. Also, the Contractor shall

provide the Construction Observer the depth of the lateral and property line riser relative to the street centerline elevation.

6.09 MANHOLE CONSTRUCTION

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

Unless specified otherwise, all manholes shall be wet cast; dry cast manholes will not be accepted.

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

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

Drop manholes shall have precast drops or drops supported with peastone per the detail at the end of this section.

Stubs shall be provided in manholes for future connections as shown on the plans or as directed by the Township. All such stubs shall be sealed with standard watertight, removable plugs. Stubs shall be a minimum length of 10 feet.

All openings in manholes for the purpose of receiving pipes (including openings for future pipes) shall be fitted with a flexible type connector. Flexible connectors shall be factory installed. Openings for future connections shall have a minimum 10 foot stub and be sealed by an approved prefabricated cap or plug. Bituminous waterproofing shall be applied to the outer surface of all manholes at the rate of one (1) gallon per 100 square feet.

6.10 CUT-INS

When cutting into an existing manhole, the opening shall be no larger than is necessary to admit the new sewer. The opening shall be made by a concrete drilling or coring machine, and shall have a mechanically compressed flexible joint connection installed. All broken or surplus material falling inside the structure shall be removed. If the manhole has a protective lining, the lining shall be repaired as recommended by the manufacturer.

Flow channels and/or drop connections shall be constructed as specified or as directed to accommodate the sewer being cut-in. Pipe inverts higher than 2' from the primary flow channel will require a drop connection to the primary flow channel.

No connections will be allowed between 6" and 2' above the primary flow channel. The inlet pipe slope must be revised so that the pipe enters within 6" from the primary flow channel.

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 shall assist the Township in the performance of these tests when necessary.

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

The Contractor shall be responsible to maintain plugs in existing manholes to prevent any water, debris, etc. from entering the existing sewer. These plugs shall remain in place until the new sewer system is accepted by the Township.

6.11.02 Leakage Tests

The completed sewer shall be free from leaks either by infiltration or exfiltration. Manholes and sewer lines will be visually inspected for leakage.

The Contractor shall provide all necessary labor, equipment, and supervision to perform infiltration, exfiltration, and air tests in accordance with the requirements of the Township. All sewer shall be subjected to an air test unless otherwise specified below.

All sewer which is submerged by ground water to an average depth of greater than seven (7) feet above the crown of the sewer at the time of the test shall be subjected to an infiltration test.

The air test shall be performed on each section of pipe between manholes after laterals are installed. Testing shall conform to ASTM F1417 for plastic flexible pipe, ASTM C828 for clay pipe and ASTM C924 for reinforced concrete pipe. The section of pipe being tested shall be sealed at each manhole using inflatable plugs or other approved devices. All plugs shall be adequately braced. ***For development projects, leakage tests shall not be performed until all utilities have been installed in the development.***

Where the expected water table level, as determined by the soil borings, is above the sewer elevation, the pressure testing limits for dry trench condition shall be as follows:

1. Where the expected water table level is zero (0) feet to seven (7) feet above the pipe, the test pressure limits will be 3.5 to 2.5 psig.
2. Where the expected water table level is over seven (7) feet above the pipe, the test pressure limits will be 4.5 to 3.5 psig.

In a wet trench condition where the water table has risen above the pipe to a depth of less than seven (7) feet above the crown of the pipe prior to testing, the air testing limits shall be determined by adding to the original 3.5 psig. an additional

0.43 psig. for each foot the water table is above the crown of the pipe, or as determined in the dry trench condition, whichever is greater. Maximum test pressure shall be 6.0 psig.

The air pressure in the section under test shall 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 shall be added during this stabilization period as required to maintain the pressure at or above the beginning test pressure.

The rate of air loss shall be determined by measuring the time interval required for the internal pressure to decrease 1.0 psig. within the limits previously specified.

The Township will not witness or accept any air test until after the placement of all other utilities within the project area, including but not limited to gas, electric, cable, fiber optics, and phone, has been completed and the site is graded to the final grades and elevations as shown on the drawings. 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 utilities for his own benefit.

Minimum time interval for a satisfactory test shall be in accordance with the table following this section.

In the event the Township determines that the results of the air test are inconclusive because of visible infiltration, unsatisfactory or incomplete record, or improper application of testing methods or equipment, or other similar reasons, the Township may require either an exfiltration test or an infiltration test for the section or sections of sewer involved.

The allowable leakage as measured by either an infiltration test or an exfiltration test shall not exceed 100 gallons per day per inch of diameter per mile of sewer.

Sewers shall be tested for exfiltration by isolating a section or sections of the sewers between manholes by means of an approved temporary type of water-tight bulkhead. The isolated section of sewer shall then be filled with water to a level which is two and one-half (2-1/2) feet above the existing water-table but not less than two and one-half (2-1/2) feet above the crown of the sewer pipe at the high end of the isolated section under the test. The length of the section shall be such that, where possible, the water level at its lower end will not be more than five (5) feet above the crown of the pipe except as may be required by a high water table.

The length of time and the exfiltration test period shall be at the discretion of the Township. Determination of the amount of exfiltration shall be made by measurement of the loss of volume of water in the manholes. The amount of exfiltration over a 24 hour period will then be calculated from the measured loss of volume and time period.

On any section of sewer that the Township shall deem impractical to test by means of the exfiltration test specified above, as may be the case when local connections are involved, a suitable infiltration test will be required.

6.11.03 Pipe Deflection Tests (Flexible Pipe Only)

Flexible pipe is any pipe having a pipe stiffness of less than 115 psi. as defined under the requirements of ASTM Designation D-2412.

The completed installation of flexible pipe shall at no point have out-of-round deflections in the main sewer pipe greater than five (5%) percent of the pipe's actual original inside diameter. Go/no go gauging tests, using an approved pointed mandrell with nine (9) points, shall be performed by the Contractor in the presence of the Township, or the Contractor's authorized representative after the trench is backfilled, and before the surface restoration is begun. Pipe with deflections greater than five (5%) percent shall be excavated and relaid by the Contractor at no additional expense to the Owner. Vibratory rerounding of failed sections is prohibited.

The pipe shall have been in place a minimum of 30 days prior to the mandrell test. When sanitary sewer is installed within a paved street, the street shall be paved prior to the mandrell testing when required by the Ottawa County Road Commission or the Township.

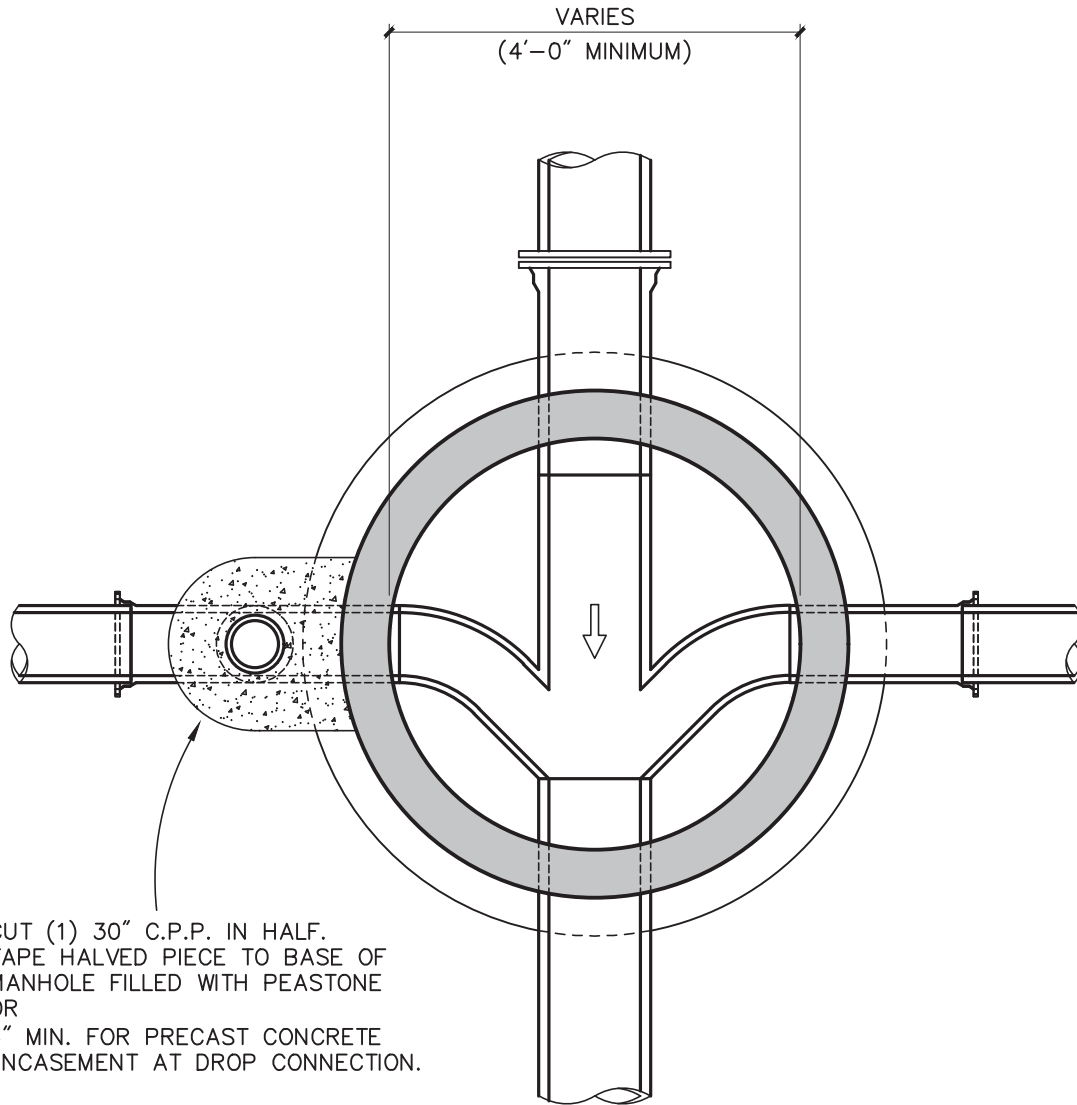
6.11.04 Televising

After the pipe deflection test, placement of the base course (when the pipe is proposed under pavement), private utilities are installed (if needed), and pipe cleaning (when the sewer has been live prior to televising), the Contractor shall conduct a continuous digital video recording inspection with the Township personnel present of all sanitary sewers. The inspection and documentation shall meet the requirements of the National Association of Sewer Service Companies (NASSCO) specification for television inspection of sewers. Closed circuit television (CCTV) recording shall be conducted in compliance with the North American Pipeline Assessment and Certification Program (PACP) standards for sewer defect identification and assessment. Work shall be performed by a PACP certified operator and delivered on a professional quality recording media with audio input that is compatible with the Owner's Engineer's and Owner's equipment for viewing. The televising software shall be PACP certified by NASSCO and shall be capable of both exporting to and importing from the standard PACP database. ***For development projects, televising shall not be performed until all utilities have been installed in the development.***

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

The Contractor shall provide a written report, with recordings in .mpg or .avi format. The recording shall show the name of the project, the date and approximate time of recording, the name of the street, the manhole numbers of each end of each run (the "from" and "to" manholes), and stationing between manholes. The recording shall

clearly show the pipe interior, joints, alignment, and wye locations and stations, and shall be reviewed by the Township's Engineer for evidence of compliance with the Contract Documents for workmanship and materials.



CUT (1) 30" C.P.P. IN HALF.
 TAPE HALVED PIECE TO BASE OF
 MANHOLE FILLED WITH PEASTONE
 OR
 6" MIN. FOR PRECAST CONCRETE
 ENCASEMENT AT DROP CONNECTION.

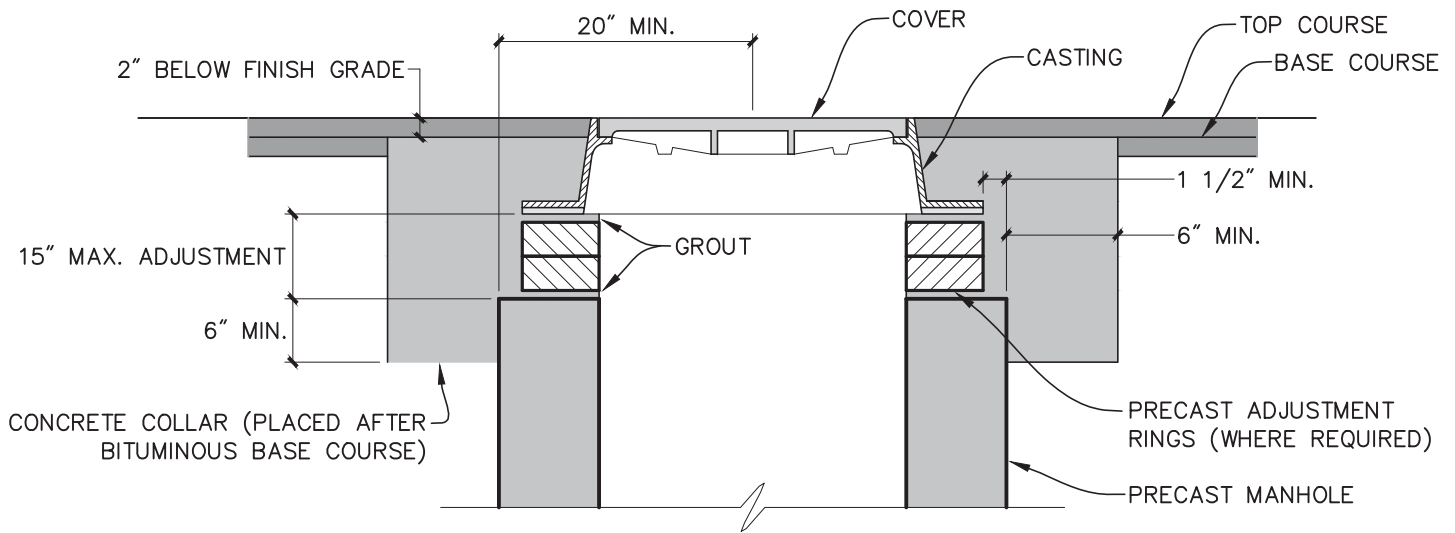
PLAN VIEW

STANDARD SANITARY SEWER MANHOLE (PRECAST CONCRETE)

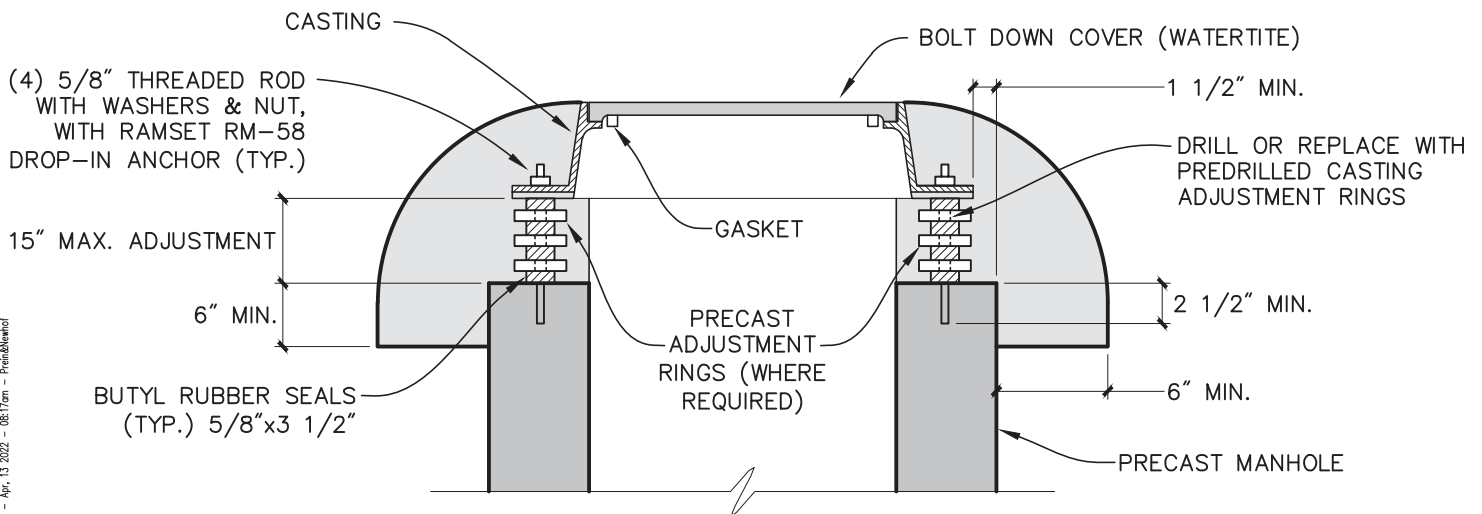
NOTES

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|---|
| <ol style="list-style-type: none"> 1. IF BOTTOM IS PRECAST CONCRETE, SET ON MINIMUM 4" SAND SUBBASE (CIP) OR CLASS 1A CRUSHED STONE WRAPPED WITH GEOTEXTILE FABRIC WHEN IN UNSTABLE SOIL CONDITIONS OR AS SPECIFIED BY THE TOWNSHIP. 2. CONE MAY BE ROTATED TO ALIGN STEPS TO VARIOUS LOCATIONS IN MANHOLE. 3. FLOW CHANNEL WALL HEIGHT SHALL BE EQUAL TO CROWN OF PIPE. |
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CASE I : MANHOLE IN ROADWAY



CASE II : MANHOLE IN EASEMENT—OUTSIDE OF ROADWAY

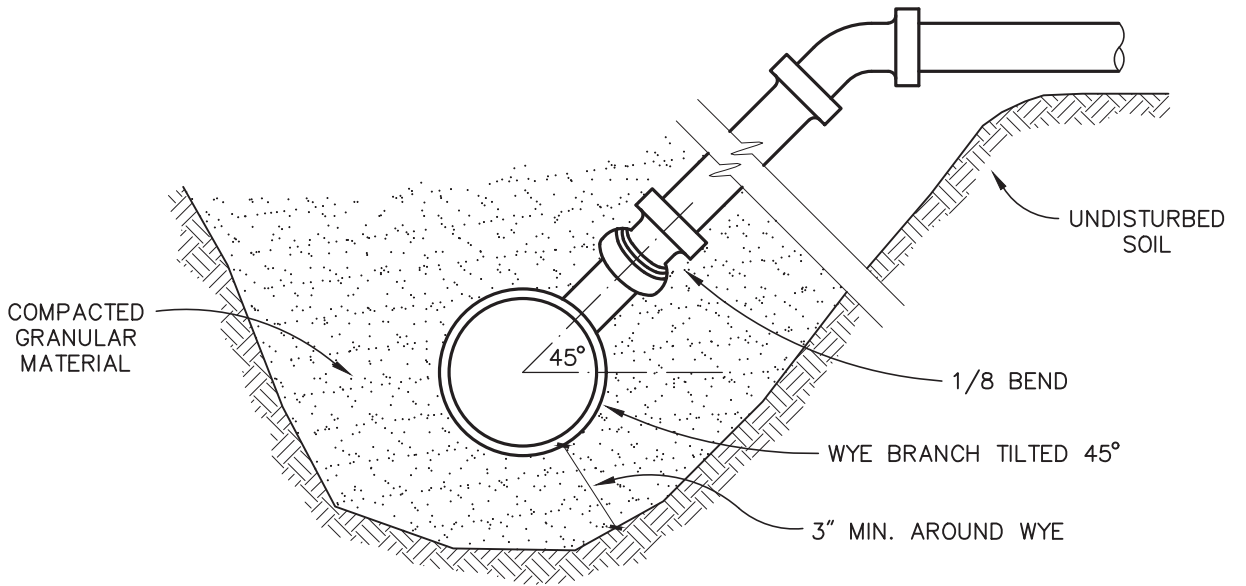
BOLT DOWN CASTING WITH RUBBER GASKET SEAL

STANDARD SANITARY SEWER CASTING DETAILS

SCALE : NONE

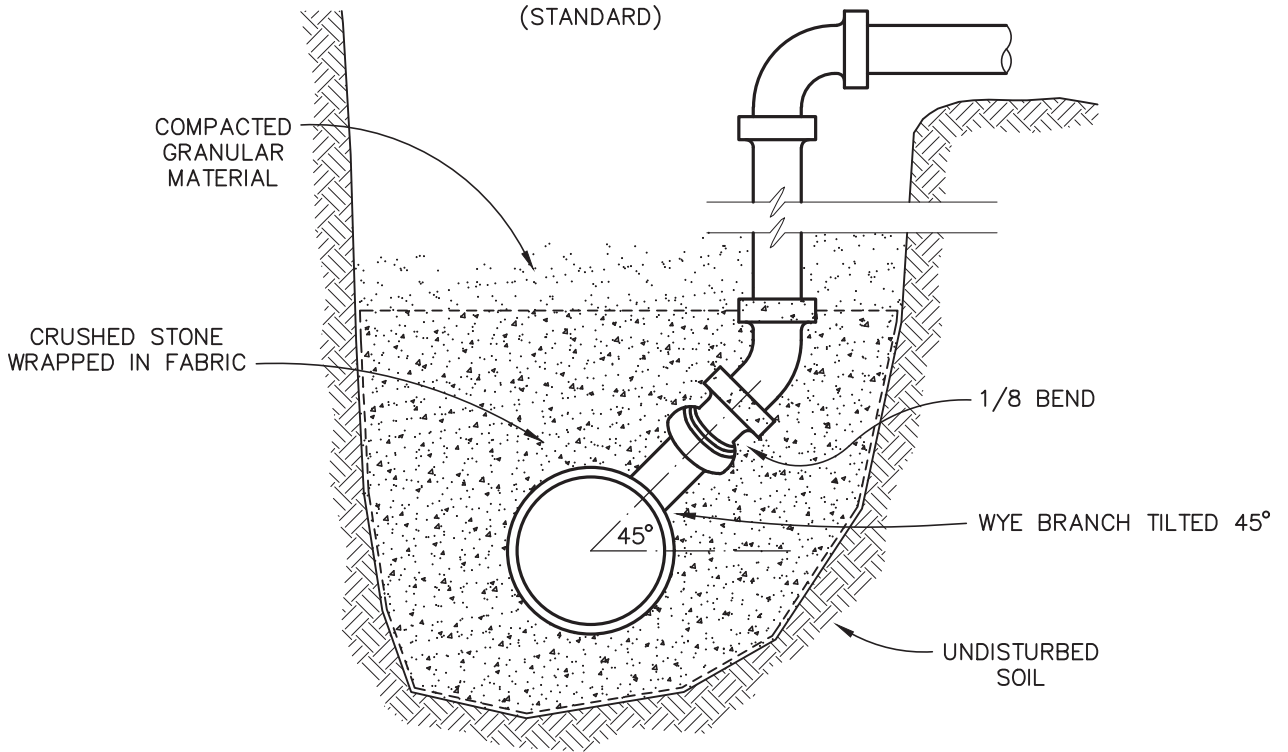
T:\DWG\3D PROJECTS\2021\210111_LACT_SPECIFICATION DRAWINGS\4_PROD\SECTION 6 - SANITARY SEWER\6-15_CASTING REPLACEMENT.DWG - WSMITH - Apr. 13 2022 - 08:17am - Print/Model





SLOPING TRENCH

(STANDARD)



VERTICAL TRENCH

(ONLY WITH TOWNSHIP APPROVAL)

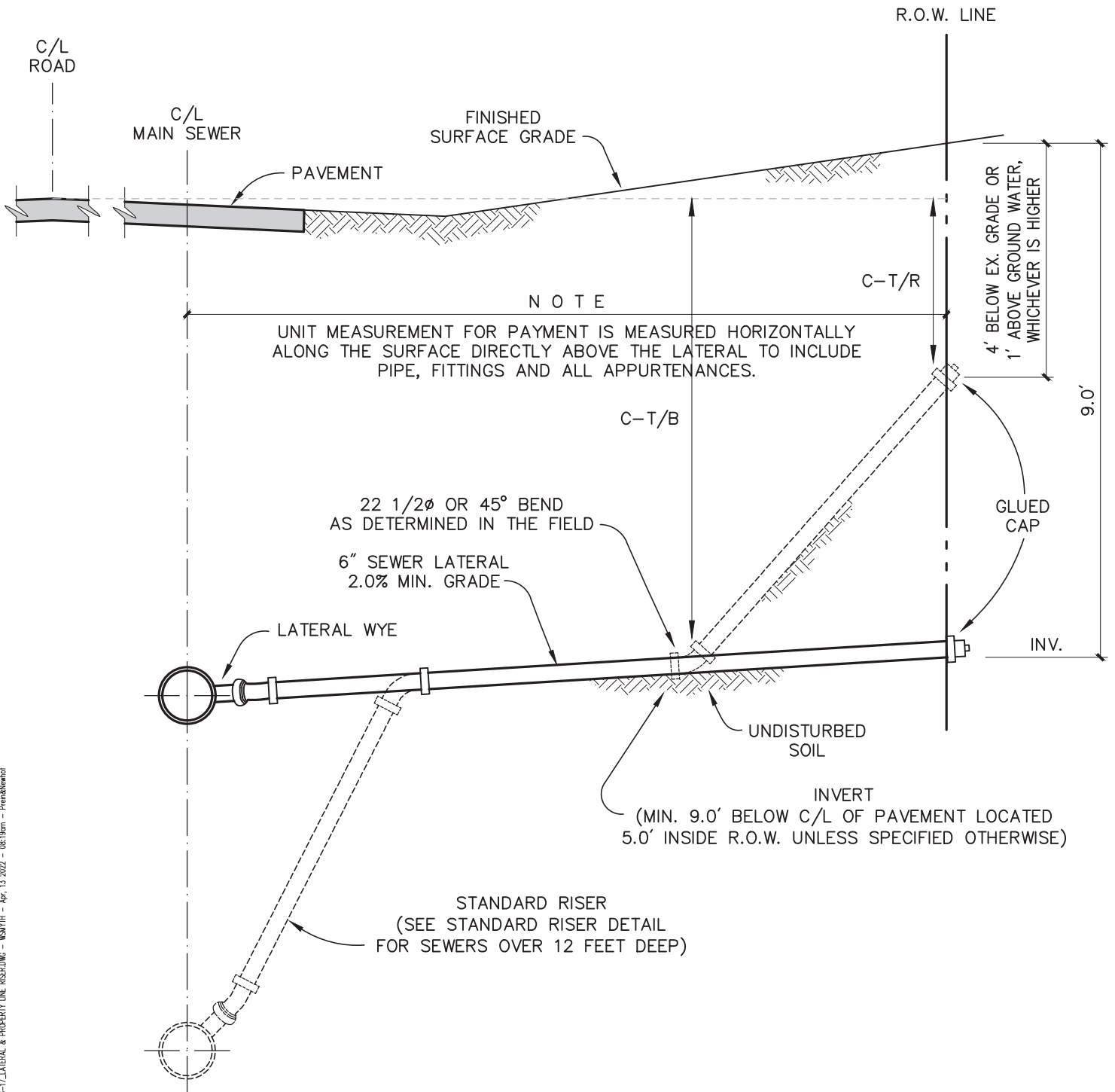
STANDARD RISER DETAILS

(SEWERS OVER 12 FEET DEEP)

NOTE

SEE PLANS OR SPECS FOR SIZE AND DEPTH OF LATERAL





LATERAL AND PROPERTY LINE RISER DETAILS

NOTE

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



04/2022