

MILLCREEK TOWNSHIP SEWER AUTHORITY

SPECIFICATIONS FOR

POLYVINYL CHLORIDE (PVC) NON-PRESSURE PIPE

1. POLYVINYL CHLORIDE (PVC) PIPE

- 1.1 PVC 1-inch to 4-inches diameter; ASTM D1785 designation PVC 1120, Schedule 40, socket type with solvent joints.
- 1.2 PVC pipe 6-inches to 15-inches diameter; SDR 35 shall meet or exceed the requirements of the latest revision of ASTM D-3034. PVC pipe 18-inches to 27-inches diameter; F/dy=46 shall meet or exceed the requirements of the latest revision of ASTM F-679.
- 1.3 Fittings and joints for PVC pipe shall meet or exceed the requirements of ASTM D-2855 for solvent joints ASTM D3212 for gasket joints. Gaskets shall comply with ASTM F-477.
- 1.4 Maximum pipe laying length shall be 13 feet.
- 1.5 Maximum run of sewer line shall be no longer than 400 feet.
- 1.6 The pipe shall be made of PVC plastic having a bell classification of 12454-B or 12454-C or 13364-B (with minimum tensile strength of 41.4 MPa (6000.00 PSI) as defined in specification D-1784.

2. PIPE - SEWER PIPE

- 2.1 Where the total quantity required, including all pipe sizes, is less than 2,000 feet, visual inspection at the site for conformance with the applicable standard specifications. PVC pipe shall be tested and marked in conformance with ASTM D-3034.

3. EXCAVATION AND BACKFILL

3.1 Maximum Trench Width

- 3.1.1 Trenches shall be wide enough to permit proper installation of the materials and to provide space for backfilling around and under the installed lines.

- 3.1.2 The maximum width of trenches for unencased pipe lines which will have 4.5 feet or more of cover shall be 18-inches for 8-inch pipe and smaller, and 1-1/2 times the inside diameter plus 8-inches for larger pipe.
- 3.1.3 Maintain these maximum widths from the bottom of the trench to a plane 12-inches above the crown of the pipe. For sheeted trenches, the maximum width shall be measured between the inside faces of the sheeting.
- 3.1.4 If these maximum trench widths are exceeded, a stronger pipe than originally specified shall be provided as approved by Engineer.

3.2 Sheeting and Bracing

- 3.2.1 Trenches shall be sheeted and braced or otherwise protected as required by any federal or state laws and municipal ordinances, and as may be necessary to protect life, property, or the work.
- 3.2.2 Sheeting shall be driven to prevent adjacent soil entering the trench either below or through the sheeting.
- 3.2.3 Use tight sheeting in or along paved streets and roadways below the intersection of a 1:1 slope line from the nearest face of the excavation to the edge of the pavement.
- 3.2.4 Remove sheeting and bracing as the work progresses so as to prevent caving of the sides of the excavation or damage to any structure. Fill voids left by withdrawal of the sheeting and bracing with fine sand, and ram or jet into place.

3.3 Dewatering

- 3.3.1 Provide and maintain at all times during construction ample means and devices for removing and properly disposing of water entering the excavations or other parts of the work until all pipe laying work has been completed.
- 3.3.2 Do not lay masonry or pipe in water, and do not allow water to rise over masonry for at least 48 hours after installation.

3.4 Pipeline Foundations

- 3.4.1 When the ground is firm and unyielding, place bedding material for pipelines and masonry structures directly on the bottom of the excavation.

- 3.4.2 When shown on the Drawings or ordered by the Authority in writing, strengthen excavated areas for foundation purposes by furnishing and placing granular foundation material, concrete cradle or encasement, timber piling, or a combination of these materials.
- 3.4.3 If the contractor decides that the soil is inadequate and the Authority agrees, the poor soil shall be removed and the excavation stabilized as directed by the Authority. The material shall be placed in lifts not over 12 inches thick, loose measure, and compacted to 85 percent of maximum density as specified in ASTM D1557. The material shall be stone or gravel ranging in size from ¾ inch to 6-inches. Payment by cubic yard.
- 3.4.4 If the Engineer disagrees with the opinion of the Contractor as to the adequacy of the foundation soil, a soil load test or tests shall be made to determine the safe bearing capacity of the ground, and construction shall proceed based on the results of tests. If the tests confirms the opinion of the Contractor, the tests will be paid for by Owner: otherwise the costs shall be paid for by Contractor.

3.4.5

3.5 Bedding Material

- 3.5.1 Backfill trenches for other than ductile iron pipe-lines 4-inches in diameter or larger to a plane 12-inches above the top of the barrel of the pipe with bedding material consisting of no. 67 crushed aggregate as specified in ASTM D692.
- 3.5.2 Backfill ductile iron pipelines to the quarter point of the pipe with bedding material consisting of No. 67 crushed aggregate as specified in ASTM D692.
- 3.5.3 Bedding shall be provided for all Polyvinyl Chloride (PVC) Pipe and shall consist of crushed stone conforming to ASTM No. 67 and passing the following sieve sizes:

Sieve Size	Percent Passing
3/4	100
1/2	80 - 90
3/8	65 - 75
No. 4	40 - 50
No. 16	15 - 20
No. 50	7 - 12
No. 200	3 - 5

The bedding material shall be placed from a minimum of 4-inches below the outside bottom of the pipe to a point 12-inches above the outside top of the pipe for the full width of the trench excavation.

- 3.5.4 Bedding material shall extend to the outside face of masonry structures which are a part of the pipeline.
- 3.5.5 Bedding material below the centerline of the pipe shall be placed in not greater than 12-inch layers and spaded or water jetted and vibrated into position beneath the curve of the pipe.
- 3.5.6 Minimum Cover - sewers shall be covered with back-fill material to a depth of not less than 4.5 feet.
- 3.5.7 Backfill the space between the sides of the excavation and the outer surfaces of manholes with bedding material to a plane 12-inches above the highest connected pipe which does not have a drop connection.
- 3.5.8 Concrete encase the sewer line if the sewer line crosses within 3 vertical feet of a culvert, another sewer line, or water line. Concrete encase the sewer line in stream crossings. Ductile Iron Pipe will be used for stream crossings.

4. UNPAVED AND PAVED AREAS

- 4.1.1 Backfill trenches above the bedding material with the excavated soil, if suitable, or with other Authority approved material, unless specified otherwise. Do not drop rocks larger than 6-inches in the largest dimension into the trench or place within 4-inches of each other.
- 4.1.2 Backfill trenches within the limits of PAVED AREAS above the bedding material with granular trench backfill, unless specified otherwise. Backfill is to be installed in accordance with the requirements of Millcreek Township for Township streets and in accordance with the requirements of PennDOT for state highways.

5. GRAVITY SEWER INSTALLATION

5.1 Survey Line and Grade

- 5.1.1 Provide the survey line and grade control stakes, at a 25-foot maximum spacing, required to install the pipeline at the locations and elevations shown. A greater spacing of grade stakes will be permitted by the Authority if a laser is used to maintain line and grade.
- 5.1.2 Provide a minimum of three batter boards, a top line, and a grade pole to transfer the line and grade to the bottom of the trench, unless a laser beam is used for this purpose. The line and grade of the batter boards or laser beam shall be checked after each 100 feet of pipe is laid.
- 5.1.3 Grade poles shall be equipped with either a plumb line or two spirit levels and care exercised to insure a truly vertical gauge pole when readings are made and pipe is being set. A surveyor's instrument may also be used to check line & grade.

5.2 Pipe Laying

- 5.2.1 Lay sewer pipe to line and grade only after the trench has been prepared. Mud, silt, gravel, and other foreign material shall be kept out of the pipe and off the jointing surface.
- 5.2.2 Bedding material for pipelines shall be No. 67 crushed aggregate as specified in ASTM D448. Shape and form the bedding material so that the bottom quarter of each pipe is uniformly supported along entire length. Recess the material at the bells, if any, so that they are relieved of any load.

5.3 Service Connections

- 5.3.1 Provide service connections for house sewers in the main sewer as shown on the drawings. The exact location of each connection shall be as noted on the design plans.
- 5.3.2 Connection openings on bell and spigot pipe shall consist of wye branches with a 6-inch internal diameter, and a 90 degree bend.
- 5.3.3 Close connection openings with a water tight gasketed stopper compatible with the pipe material and held in place with the same joint material as that specified for the main sewer. Closures shall be strong enough to withstand test pressures.
- 5.3.4 Where the sewer centerline is 8 feet or less below the surface of the ground, lay tee branches with the branch sloping slightly upward from the horizontal.

- 5.3.5 Where the sewer centerline is more than 8 feet below the surface of the ground, raise connection openings by installing a service riser to an elevation of 8 feet below the surface or to the elevation required to service the property or structure.
- 5.3.6 Lay pipe risers at an angle of 45 degrees. Risers shall be PVC pipe or as indicated. Trenches for risers shall be no more than 18 inches wide and the pipe shall be laid on a foundation of bedding material and backfilled with the same material to 8 inches above the pipe in the same manner as the main sewer. If risers are to be laid at an angle greater than 45 degrees, special bedding requirements are necessary.
- 5.3.7 The general requirements for construction of sewers (including bedding and backfill requirements) shall also apply for construction of Service Connections.
- 5.3.8 Lay Service Connections with a minimum grade of 1/8 inch per lineal foot.

6. TESTING

6.1 Air Test

- 6.1.1 Place pneumatic plugs with a sealing length equal to or greater than the diameter of the pipe to be tested in both ends of the pipe and inflate to 25 psi. Pressurize the sealed sewer pipe to four psi above the average back pressure of groundwater over the sewer pipe and allow the air pressure to stabilize for at least two minutes.
- 6.1.2 After the stabilization period, pressurize the line to 3.5 PSI and measure the time in minutes for pressure to drop to 2.5 PSI. If groundwater is present, increase the air pressure within the pipe to 3.5 PSI above the level of the ground water and measure in minutes the time for the pressure to drop one PSI.
- 6.1.3 Air pressure drop of one PSI shall not occur in less time than 3 minutes or 50 seconds per square foot of pipe cross-sectional area per 25 feet of pipe length, whichever is greater.

6.2 Deflection Test for Polyvinyl Chloride (PVC) Pipe

- 6.2.1 Authority shall randomly select portions of the project to be deflection tested. Such portions shall consist of the manhole intervals for the initial sewer construction up to 1,200 lineal feet and not less than 10 percent of the remainder of the sewer project.
- 6.2.2 The 5 percent deflection test for pipe sizes six (6) to fifteen (15) inch in diameter is to be run using a nine-arm mandrel having a diameter equal to 95 percent of the base diameter of the pipe as established in ASTM D-3034.
- 6.2.3 The individual lines to be tested shall be so tested no sooner than 30 days after they have been installed.
- 6.2.4 Whenever possible and practical, the testing shall initiate at the downstream lines and proceed towards the upstream lines.
- 6.2.5 No pipe shall exceed a deflection of 5 percent.
- 6.2.6 In the event that the deflection exceeds the 5 percent limit in 10 percent or more of the manhole intervals tested, the total sewer project shall be tested.
- 6.2.7 Where deflection is found to be in excess of 5 percent of the original pipe diameter, the contractor shall excavate to the point of excess deflection and carefully compact around the point where excess deflection was found. The line shall then be retested for deflection. However, if after the initial testing the deflected pipe fails to return to the original size (inside diameter) the line shall be replaced.

7. RESTORATION

- 7.1 Any and all areas disturbed by construction shall be left in as good condition as it was before the start of work, and it shall be promptly and regularly maintained in such condition during a period of eighteen (18) months after acceptance of the work. This restoration includes all pavements, curbs, gutters, driveways, sidewalks, lawns and trees.
- 7.2. Scarify subgrade to 3-inch depth where topsoil is scheduled. Place 3 inches of topsoil where scheduled and roll material. Place only during dry weather.
- 7.3 Seeding in Pennsylvania Department of Transportation right-of-ways shall conform to Pennsylvania Department of Transportation specifications. Seeding in all other areas shall use the following seed mixture.

Kentucky Blue Grass: 50 percent
Creeping Red Fescue Grass: 30 percent
Norlea Perennial Rye: 20 percent

- 7.4 All roadways, highways, driveways, and sidewalks shall be broomed and kept clear of any debris such as stones, dirt, tools, or any other materials.

8. STANDARD MANHOLES (36" PIPES OR SMALLER)

- 8.1 Manhole Frames and Covers shall be the Standard Manhole Frames and Covers, as manufactured by East Jordan Iron Works, Inc., catalog no. 1975A (solid Lid) or 1975B (with vent holes) or approved equal. Cast iron shall conform to ASTM A-48, Class 20 or better. The frames shall be set in a bituminous jointing compound. Frames shall have "Sanitary Sewer" cast into the cover lid.
- 8.2 Precast concrete adjustment rings, minimum height 3 inches, maximum 9 inches, shall be provided on all manholes. Frames shall have "Sanitary Sewer" cast into the cover lid. A tapered adjustment ring shall be used to match slopes in the grade. In roadways a 3" rubber composite adjustment riser shall be added. The manhole frame and cover shall be placed on the rubber composite riser using the manufacturer's sealant. Riser shall be "INFRA RISER" by East Jordan Iron Works, Inc.
- 8.3 Manhole cone and sidewalls shall be concentric with eccentric on top or flat top section, and of precast construction, conforming to ASTM C-478. Joints shall conform to the Millcreek Township Sewer Authority General Specifications for gravity sewers, drains, and appurtenances.
- 8.4 Manhole bases shall be precast, reinforced concrete bases conforming to ASTM C-478. Precast bases shall be six (6) inches minimum thickness with adequate reinforcing steel for all stresses anticipated in handling, and in place.
- 8.5 Manholes for pipe sizes 27 inches or smaller shall be 4-foot inside diameter and Manholes for pipe sizes 30 inches or larger shall be 5-foot inside diameter.
- 8.6 Manhole steps shall be Polypropylene with 3/8 inch steel reinforced rod. The top manhole step shall be placed no more than 18" from the top rim unless directed otherwise by the Authority Engineer or Authority Representative.
- 8.7 Manhole fillets shall be Class A concrete (6 bag). All pipes shall have fillets at pipe inverts and shall all be channeled to and through the outflow invert.
- 8.8 Manhole shall have a rubberized Boot Seal (Link Seal) or approved equal to provide a watertight seal.
- 8.9 Manhole exterior shall be sealed with an approved bitumastic material.

8.10 Precast manhole bases shall be set level on a bed of gravel, minimum thickness of four (4) inches. All construction shall conform to the Millcreek Township Sewer Authority General Specifications for gravity sewers, drains, and appurtenances.

8.11 All additional holes shall be cored and boot seals shall be installed.

9. DROP MANHOLES

9.1 Drop manhole assemblies shall be installed when the difference in inverts of the pipes are over 2 feet. No pipe inverts shall be more than six inches (6") above the bottom invert.

9.2 Drop manholes shall have the same specifications as the standard manholes except for the drop assembly.

9.3 Drop manholes shall have an outside drop assembly which shall enter the manhole at the same centerline as the largest main sewer line.

9.4 The drop pipe shall be encased with 8" of class "A" concrete.

9.5 The drop pipe assembly may be cast integral with the manhole sections.

9.6 Top pipe shall be dammed with brick & mortar $\frac{2}{3}$ of the diameter of the pipe.

9.7 The drop pipe shall be a minimum of 8" and shall not be less than 2 nominal diameters than the top pipe.

9.8 Special backfill shall be placed in the trench a distance of 6 feet from the drop assembly.