

FOX METRO WATER RECLAMATION DISTRICT
MANHOLE / SEWER PIPE MATERIALS AND INSTALLATION SPECIFICATIONS

MATERIALS

1. PIPE & FITTINGS

Pipe and fittings used in sanitary sewer construction shall be polyvinyl chloride (PVC) pipe. PVC pipe and fittings dated over one year old shall not be permitted for use. No glued joints shall be allowed outside of the foundation wall of any building.

The types of PVC pipe and fittings that shall be used in the District include:

- Poly Vinyl Chloride (PVC) Sewer Pipe and Fittings (ASTM – SDR series), conforming to ASTM Numbers D-1784, D-3034, D-3212, F-412, and F-477.
- Poly Vinyl Chloride (PVC) Pressure Rated Pipe and Fittings (ASTM - SDR series), conforming to ASTM Numbers D-1784, D-2241, D-3139, F-412 and F-477.
- Poly Vinyl Chloride (PVC) Pressure Rated Pipe and Fittings (AWWA DR-series) conforming to AWWA C-900, AWWA C-905, and ASTM Numbers D-1784, D-3139, F-412, and F-477.

All PVC plastic pipe and fittings shall have a cell classification of 12454 as defined in ASTM D-1784 and shall have minimum pipe stiffness as shown below in Table 1. The required Standard Dimension Ratio (SDR) or Dimension Ratio (DR) for PVC pipe and fittings shall be selected based upon the depth of cover, as also shown in Table 1.

Depth of Cover	Pipe Diameter	Fox Metro WRD Minimum Thickness	National Standard	Minimum Pipe Stiffness
0' - 15'	6" - 12"	SDR 26	ASTM D-3034	115
0' - 15'	6" - 12"	SDR 26	ASTM D-2241	115
0' - 20'	6" - 12"	SDR 21	ASTM D-2241	224
0' - 30'	6" - 12"	DR-18	AWWA C-900	364
0' - 30'	14"	DR 18	AWWA C-905	364

PVC pipe fittings conforming to ASTM D-3034 and ASTM D-2241 shall have a minimum wall thickness of SDR 26 plastic pipe as defined in table 1 (ASTM D-3034 or ASTM D-2241), and at least the same thickness of the main sewer line in which they are being installed.

Fittings in sizes through twelve (12) inches shall be molded in one piece (re-designed 3-piece Plastic Trends fittings included) with elastomeric joints and minimum socket depths as specified in each respective section. Fittings above twelve (12) inches shall be molded or fabricated with elastomeric joints in accordance with ASTM standards D-1784 and D-3139 incorporating the manufacturer's standard pipe bells and gaskets. Gaskets shall conform to ASTM F-477 and ASTM F-913.

Joints shall meet the requirements of ASTM Standard D-3212 or D-3139, whichever is applicable. Fittings with a gasket retention race formed by heating or crimping are not permitted throughout the

District. Fox Metro Water Reclamation District reserves the right to approve/reject all pipe and fittings on a case-by-case basis.

2. BEDDING, HAUNCHING, AND INITIAL BACKFILL

Bedding material shall be CA-7 Class 1A, as outlined in ASTM D-2321 and shall be certified by the manufacturer and approved by the District prior to installation, to have the following characteristics:

- Description: Shall be crushed stone or crushed gravel, as produced from crushing by mechanical means.
- Gradation: Shall meet the IDOT gradation of CA-7, Class 1A.
- Plasticity Index: Shall meet a plasticity index of 0 to 4 percent as determined by the method given in AASHTO T 90.
- Specific Gravity: Shall have a specific gravity (dry) of greater than 2.45.
- Sources of Supply: All sources of supply shall be approved by the District. Only coarse (fractured) aggregates from these sources shall be used on the job unless approval in writing is obtained from the District.

LABORATORY TEST

The District reserves the right to require a contractor to submit certified copies of all reports of tests conducted by an independent laboratory before installation of PVC plastic pipe. Tests shall be conducted in accordance with Standard Method of Test for "External Loading Properties of Plastic Pipe by Parallel-Plate Loading."

INTERNAL DIAMETER

Pipe shall be constructed so that the internal diameter does not decrease by more than five (5) percent, in order to provide the complete hydraulic carrying capacity, and to obtain the joint performance at five (5) percent maximum diametric deflection.

PIPE INSTALLATION AND FIELD TESTING

1. INSTALLATION

When a span due to over-dig at any wall or foundation exceeds two (2) feet, a six (6) inch SDR 21 (or thicker) PVC pipe sleeve through the wall shall be added through the span of the over-dig area. This sleeve must extend an additional two (2) feet beyond the over-dig area, with a stone base for the entire building sewer resting on undisturbed soil. This sleeve will accommodate a four (4) inch PVC schedule 40 (or approved equal) pipe that must be sealed at the sleeve, using a six (6) inch x four (4) inch regular brand mission coupling. The sleeve pipe shall increase as necessary to accommodate a larger sewer service pipe when required, and shall be supported by CA-7 Class 1A crushed stone or gravel. See Fox Metro's "trench detail for sanitary sewer & mains" and "sanitary service through porch box wall".

Trench widths should be stable or supported, provide a width sufficient, but no greater than necessary to ensure working room to properly and safely place and consolidate haunching and other embedment materials. The space between the pipe and trench wall must be wide enough to hand-work and place said haunching material. From the trench floor to twelve (12) inches above the top of pipe, the minimum trench width shall be the outside diameter of the pipe plus sixteen (16) inches and the maximum trench width shall be the diameter of the pipe plus twenty four (24) inches.

When trench wall supports, such as trench sheeting, trench jacks, trench shields or boxes are used, ensure the support of the pipe and its embedment is maintained throughout installation, including during and after the removal of such supports.

Pipe size shall be a minimum of 8" for sewer mains and 6" for sewer services. Pipes shall be laid in a manner which provides uniform support over the entire length. No blocking of any kind shall be used to adjust the pipe to grade except when embedment concrete is used. Bedding shall be a minimum of six (6) inches in depth. The bedding material shall be placed and worked in around pipe by hand to provide uniform support, then around and over the crown of the pipe by a minimum thickness of twelve (12) inches. The granular embedment material shall be placed and consolidated the full width of the trench. The contractor shall be required to install the pipe in such a manner that the diametric deflection of the pipe shall not exceed five (5) percent.

PVC transition fittings shall be used in all new construction when joining PVC pipes of different outside dimensions.

Service connections to new mains shall be with a tee/wye fitting with a 6" branch and shall connect to the main at a 45 degree angle.

Cast iron clean out covers conforming to ASTM class 25 or higher shall be required for all sanitary sewer services located in any paved surface. Locations of said covers shall be limited to a spacing of no greater than 100 feet or that constructed per the approved engineering plan.

The use of ductile iron & cast iron pipe is not allowed for the use of gravity sewers in the Fox Metro Water Reclamation District. Ductile iron or cast iron pipe may be used in the construction of "casings" or "sleeves" around PVC carrier pipes, as well as in the construction of pump station piping and force mains.

No glued joints shall be allowed outside of the foundation wall of any building. 4" X 6" non-shear couplings shall be used to connect the building drain to the building sewer.

Whether any grease trap is newly constructed or "retrofitted" to an existing building, all Fox Metro guidelines pertaining to minimum slope and cover depth for sanitary construction shall be strictly adhered to. Refer to applicable Fox Metro specifications and construction details for specific information.

2. TESTING

Before final acceptance, all sanitary sewers shall be tested in accordance with Section 31-1.11 of the "Standard Specifications for Water and Sewer Main Construction in Illinois" (*see item #2 under "Manhole Installation and Field Testing" below for vacuum testing). Specifically, all pipelines constructed of polyvinyl chloride (PVC) shall be subject to air exfiltration, deflection, vacuum and televising tests.

The deflection test shall be performed no sooner than thirty (30) days of the backfilling operation and shall consist of measuring the pipe for vertical ring deflection. Maximum ring deflection of the pipeline under load shall be limited to five (5) percent of the internal pipe diameter. All pipes exceeding this deflection shall be considered to have reached the limit of its serviceability and shall be re-laid or replaced by the contractor at their sole expense.

The cost of all deflection testing shall be borne by the contractor and shall be accomplished by pulling a mandrel, sphere, or pin-type "go / no go" device, with a diameter equal to ninety-five (95) percent of the un-deflected inside diameter of the flexible pipe, through the pipeline. DR 18 pipe is exempt from mandrel testing in the Fox Metro W.R.D. service area.

All sanitary sewer (public or private) having a diameter of eight (8) inches or greater shall be televised by the District. Said televising work is scheduled once all sanitary testing (air & vacuum) has been received by Fox Metro. Any defects in said sewer shall be required to be excavated and repaired at the contractor's or developer's sole expense. Caution should be taken before constructing roads, curbs, sidewalks or any other infrastructure, whether it is above or below the ground surface. It is the responsibility of the utility contractor and the developer to contact Fox Metro prior to installing any of these utilities or infrastructure. Repairs to defective sanitary sewers shall be performed regardless of the status of other construction.

MANHOLE INSTALLATION AND FIELD TESTING

1. INSTALLATION

All manhole castings, adjusting rings and manhole sections shall be set in BUTYL rope or approved equal. The inside joints of manhole sections, adjusting rings, and frame shall not be mortared. However, the area between the pipe and flow channel shall be filled with cement mortar to provide a flush smooth surface. Each manhole cone and barrel section joint shall also be externally sealed with a *6" or **9" wide (min.) sealing band of rubber and mastic (see "REPAIRS" below). The band shall have an outer layer of rubber or polyethylene with an under layer of rubberized mastic (with a protective film), meeting the requirements of ASTM C-877, **type II or *type III. Pipe connections to all manholes through openings (cast or core-drilled) shall be provided with a flexible rubber watertight connector conforming to ASTM C-923, "Standard Specifications for Resilient Connectors between Reinforced Concrete Manhole Structures and Pipes". A maximum of 8 inches of adjusting rings (2 total rings) is allowed. The frame, chimney, and top "lip" of the cone section shall be required to be sealed with a chimney seal. Only "Adaptor-Seal", "Infi-Shield", Canusa (Wrapid Seal), FlexRib or an approved equal will be allowed. Do not use unapproved seals.

When a new manhole is approved to be constructed only Cascade brand (CR style), or approved equal, stainless steel repair clamps shall be installed. Only repair clamps conforming to ANSI/NSF-61 shall be allowed. This work shall be inspected by Fox Metro W.R.D.

2. TESTING

Each new manhole shall be vacuum tested after manhole is at finished grade. All lift holes shall be plugged with a non-shrinking grout. The manhole frame, adjusting rings and chimney seals shall be in place when testing. No grout shall be placed in the horizontal joints before, after or during testing in order to achieve a passing test result. All pipes entering the manhole shall be plugged, taking care to securely brace the plugs from being drawn into the manhole. A vacuum of ten (10) inches of mercury shall be drawn and the vacuum pump shut off. With the valves closed, the time shall be measured for the vacuum to drop to nine (9) inches of mercury (Hg) for the following time periods for each size manhole:

*Forty-eight (48) inches Diameter - sixty (60) seconds

*Sixty (60) inches Diameter – seventy-five (75) seconds

*Seventy-two (72) inches Diameter - ninety (90) seconds

*Manhole testing will be in accordance with ASTM-1244-93 or in accordance with Fox Metro W.R.D. requirements. In case of conflict, the more stringent requirement will apply (e.g. where deeper manholes are constructed).

The contractor shall provide all material and equipment necessary for testing. Should the manhole fail the vacuum test, all leaks shall be sealed with an approved non-shrinking grout and re-tested until a satisfactory result is obtained.

REPAIRS & REHABILITATION OF EXISTING PIPES AND MANHOLES

1. PIPES

Pipe connections of dissimilar materials shall be made with a non-shear flexible neoprene "Mission" brand connector with stainless steel bands, where no "hub" exists.

Where a new home is constructed on any lot where the sanitary service is made of rigid materials such as vitrified clay, cast iron, or ductile iron, said service will be required to be removed or lined to the public main. Any existing sanitary sewer main or service, which is required to be lined, shall be repaired with a cured-in-place pipe (CIPP) meeting the requirements of ASTM F1216, D5813, D790 and D2990. Said CIPP shall be installed using the inversion method only, not dragged.

Where a newly constructed sanitary main needs to be repaired due to damage having occurred during construction, Cascade brand (CR style), or approved equal, stainless steel repair clamps shall be required. Only repair clamps conforming to ANSI/NSF-61 shall be allowed. When the damage occurs within 30 feet of a manhole, the contractor shall remove and replace the damaged main from the nearest joint to the manhole.

2. MANHOLES

Each manhole, which has been disturbed in any way, including being raised or lowered, should be cleaned and dried before re-sealing. Each cone and barrel section joint shall require a double-layer of butyl rope and also be externally sealed with a *6" or **9" wide (min.) sealing band of rubber and mastic. The band shall have an outer layer of rubber or polyethylene with an under layer of rubberized mastic (with a protective film), meeting the requirements of ASTM C-877, **type II or *type III.

A maximum of 8 inches of adjusting rings (2 total rings) is allowed in any repair. The frame and chimney of the cone section shall be required to be sealed with a chimney seal. Only "Adaptor-Seal", "Infi-Shield", Canusa (Wrapid Seal), FlexRib or approved equal will be allowed.