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

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 solvent-welded 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 (cell classification), D-3034, D-3212 (joint spec), and F-477 (gaskets).
- Poly Vinyl Chloride (PVC) Pressure Rated Pipe and Fittings (ASTM - SDR series), conforming to ASTM Numbers D-1784 (cell classification), D-2241, D-3139 (joint spec), and F-477 (gaskets).
- Poly Vinyl Chloride (PVC) Pressure Rated Pipe and Fittings (AWWA DR-series) conforming to AWWA C-900 and ASTM Numbers D-1784 (cell classification), D-3139 (joint spec), F-477 & F-913 (gaskets).

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 the table below:

Depth of Cover	Pipe Diameter	Minimum Thickness	National Standard	Minimum Pipe Stiffness
3.5' - <15'	6" - 12"	SDR 26	ASTM D-3034	115
3.5' - <20'	6" - 12"	SDR 21	ASTM D-2241	224
3.5' - <30'	6" - 12"	DR-18	AWWA C-900	364
3.5' - <30'	14"	DR-18	AWWA C-905	364

Fittings in sizes through twelve (12) inches shall have 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.

The 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 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.

## 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" per ASTM D2412.

## PIPE INSTALLATION AND FIELD TESTING

### 1. INSTALLATION

If the invert of any overhead sewer exceeds two (2) feet above the footing, plate compaction of the CA-7 Class 1A aggregate shall be required in twelve (12) inch lifts.

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 haunching and other embedment materials. The minimum trench width shall be 32" plus the outside diameter of the pipe and the maximum trench width shall be 48" plus the outside diameter of the pipe.

Pipe size shall be a minimum of eight (8) inches for public sewers and six (6) inches for building sewers.

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 of twelve (12) inches. The granular embedment material shall be placed and consolidated along 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 six (6) inch branch and shall connect to the main at a (max.) forty-five (45) degree angle. Where no tee/wye exists, an Inserta Tee brand fitting shall be required.

Cast iron enclosures shall be required for all sanitary sewer service cleanouts located in any paved surface. Locations of said cleanouts and covers shall be limited to a spacing of no greater than one hundred (100) feet.

Either 4" X 6" rubber or non-shear couplings shall be used to connect the building drain to the building sewer. If using a rubber fitting, the four-inch pipe shall be inserted six (6) to twelve (12) inches inside of the six inch building sewer.

Whether any grease removal system (GRS) is newly constructed or retrofitted to an existing building, all District guidelines pertaining to minimum slope and cover depth for sanitary construction shall be strictly adhered to.

All building drains/sewers shall be overhead or "hung" through the wall of any basement.

Full-sized cleanouts shall be installed five (5) feet from the foundation wall.

## 2. TESTING

Before final acceptance, all public sewers shall be tested in accordance with Section 31-1.12 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).

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 after 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. Pipe shall be constructed so that the internal diameter does not decrease by more than five (5) percent.

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 the District. Any defects in said sewer shall be excavated, then 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 the District prior to installing any of these utilities or infrastructure. Repairs to defective sanitary sewers shall be performed regardless of the status of other construction or extraneous expenses.

## **MANHOLE INSTALLATION AND FIELD TESTING**

### **1. INSTALLATION**

All manhole castings, adjusting rings and manhole sections shall be set in butyl rope. 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 eight (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), or an approved equal will be allowed. Do not use unapproved seals.

When a new manhole is approved to be constructed on an existing public sewer, 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 the District.

## 2. TESTING

Each new manhole shall be vacuum tested after manhole is at finished grade. The manhole frame, adjusting rings and chimney seals shall be in place when testing. All lift holes shall be plugged with a non-shrinking grout. 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 District 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, the structure shall be disassembled to a point that said leak can be repaired with butyl rope. After the repair is complete, the manhole shall be re-tested until a satisfactory result is obtained.

## REPAIRS & REHABILITATION OF EXISTING PIPES AND MANHOLES

### 1. PIPES

Pipe connections of dissimilar materials where no hub exists shall be made with a non-shear coupling.

Existing non-PVC building sewers or “stubs” may not be used in connection with new buildings where a District connection permit is requested. In such cases, said building sewer or “stub” will either need to be removed to within one foot (1’) of the public sewer and then replaced with appropriate PVC material. 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. Hot water or steam shall be used to cure all liners.

Building sewers shall be permanently abandoned using one of following two methods.

- 1.) Removed to within one (1) foot of the public sewer and plugged using a mechanical plug and mortar. This is the preferred method. If this is not feasible, see item two below.
- 2.) The building sewer connection shall be sealed within the public sewer with a four (4) foot minimum length cured in place pipe (C.I.P.P.) liner with hydrophilic gaskets.

Where a newly constructed public sewer 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 thirty (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 eight (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), or approved equal will be allowed.