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MANHOLE / SEWER PIPE MATERIALS AND INSTALLATION SPECIFICATIONS FOR **DEVELOPER CONSTRUCTION** OF SANITARY SEWERS FOX METRO WATER RECLAMATION DISTRICT

1. PIPE & FITTINGS

Pipes and fittings used in sanitary sewer construction shall be polyvinyl chloride (PVC). 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 on the depth of cover, as also shown in the table below:

Table 1

Depth of Cover	Pipe Diameter	Minimum Thickness	National Standard	Minimum Pipe Stiffness
>or=3.5' - 20'	6" - 12"	SDR 26	ASTM D-3034	115
*>20’ - 25'	*6" - 12”	*SDR 21	*ASTM D-2241	*224

>26' & up	6" – 14"	DR-18	AWWA C-900	364

*4/5/2023: Per a nation-wide shortage of D-2241 pvc, this might not be available. Where SDR 21 D-2241 is not available, DR 18 C-900 pipe shall be used at depths > 20'.

Fittings in sizes through fourteen (14) inches shall have elastomeric joints and minimum socket depths as specified in each respective section shown above. The District reserves the right to approve/reject all pipes and fittings on a case-by-case basis.

2. PIPE BEDDING MATERIAL, HAUNCHING, SUITABLE SOILS, AND TRENCH BACKFILL

Bedding stone shall be thoroughly haunched to provide uniform support under the new pipe. Said bedding material, as outlined in ASTM D-2321, shall be certified by the manufacturer and approved by the District before installation, and possess the following characteristics:

- Gradation: Shall meet the IDOT gradation of CA-7, Class 1A, or any material(s) pre-approved by the District during the plan-review process (* See just below).
- Description: Shall be crushed stone or crushed gravel, *containing no more than 5% fine material, as produced by mechanical means.
- Plasticity Index of Undisturbed Earth/Trench Base Soil: Shall meet a plasticity index of 0 to 4 percent as determined by the method given in AASHTO T 90.
- Specific Gravity of Undisturbed (dry) Trench Base Material: Shall have a specific gravity of greater than 2.45.
- Initial Trench Backfill Material: Please refer to the requirements of the municipality having first jurisdiction over all applicable above or below-grade infrastructure.

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 the installation of PVC plastic pipe. Tests shall be conducted in accordance with the 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 building's 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, and 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 sizes 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 that 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. The bedding shall be a minimum of six (6) inches in depth. The bedding material shall be placed and worked all around the pipe by hand (haunched) to provide uniform support, then around and over the crown of the pipe by a minimum of twelve inches (12"). 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, or for pvc to pvc connections, where no necessary hub/and or bell exists.

All new construction service connections to new mains shall be with a tee/wye fitting with a six (6) inch branch. Where no tee/wye exists, an Inserta Tee brand fitting shall be required. All connections to the main shall be constructed at a (max.) forty-five (45) degree angle or 1/1 rise/run pitch.

Cast iron enclosures shall be required for all sanitary sewer service cleanouts located in any paved surface or in any location where cleanouts may be damaged by heavy equipment.

All cleanouts shall be full-sized, be located 5' from the building's foundation, and spaced no greater than one hundred (100) feet apart.

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 about the 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.

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".

The cost of all testing shall be borne by the developer or the contractor.

All pipelines shall be constructed of polyvinyl chloride (PVC) and shall be subject to air exfiltration, deflection, and Closed-Circuit Televising testing.

Air exfiltration testing shall be performed using the State of Illinois' guidelines and shall be directed and witnessed by an inspector for the municipality having first jurisdiction.

The deflection test shall be performed using an approved mandrel or other device permitted by the District. Testing shall occur no sooner than thirty (30) days after backfilling 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.

All sanitary sewer (public or private) with a diameter of eight (8) inches or greater shall be televised by the District. Said televising work is scheduled once all air & vacuum testing has been received by the District. Any defects in said sewer shall be excavated, then repaired at the contractor's or developer's 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 before 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 barrel section of the manhole, 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 manhole openings (casted or core-drilled) shall be constructed 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) are allowed. The frame, chimney, and top "lip" of the cone section shall be required to be sealed with a chimney seal. Only "Infi-Shield", "Adaptor-Seal", Cretex X-85, or an approved equal will be allowed.

When a new manhole is approved to be constructed on an existing public sewer, only non-shear couplers shall be installed. This work shall be inspected by the municipality having first jurisdiction or by the District.

After any manhole is at finished grade, and with adjusting rings and chimney seals in place, each structure shall be vacuum tested from the top of the casting. Any lift holes shall be plugged with a non-shrinking grout. No grout shall be placed in any horizontal joint of any manhole for any reason. 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 inches (48") in diameter - sixty (60) seconds

*Sixty inches (60") in diameter – seventy-five (75) 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). 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 those made from dissimilar materials or of pvc with differing outside diameters where no hub exists shall be made with a non-shear coupling.

Existing non-pvc building sewers or "stubs" shall 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 or lined 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, utilizing hot water or steam to cure all liners.

Building sewers shall be permanently abandoned using one of the 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, only pvc transition fittings shall be required (no non-shear couplings). 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 around the full circumference of the structure, 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 "Infi-Shield", "Adaptor-Seal", Cretex X-85, or approved equal will be allowed.