SECTION 027
SPECIFICATIONS - PIPE MATERIALS FOR SEWERS

1.0 Clay Pipe

Clay pipe for sanitary sewers shall be used only with written approval from the Engineer.

All pipe and fittings for sewers of 6-inch to 24-inch diameter shall be extra strength vitrified clay pipe, conforming to the ASTM Designation C-700, as amended.

Pipe installation and bedding shall be in accordance with Section 035 of these specifications.

1.1 Joints for Clay Sewer Pipe

Compression joints for all vitrified clay bell and spigot pipe shall meet or surpass ASTM designation C-425, as amended.

Compression couplings for (6) inch to (12) inch vitrified clay plain end pipe shall be furnished with a factory installed PVC collar instead of a clay bell and shall meet or surpass the performance requirements of ASTM C-425, as amended. The PVC collar shall conform to the requirements of ASTM D-1784, Class 12454-B.

2.0 Prestressed Concrete Cylinder Pipe

Prestressed concrete cylinder pipe and fitting for sanitary sewers shall conform to AWWA C-301 and shall consist of a welded steel cylinder with steel joint rings welded to its ends, reinforcing cage of steel bars, or welded wire fabric; and a wall of dense concrete both inside and out.

Pipe installation and bedding shall be in accordance with Section 035 of these specifications.

2.1 Joints for Prestressed Concrete Cylinder Pipe

Prestressed concrete cylinder pipe shall have bell and spigot ends formed by steel joint rings welded to the steel cylinder. Joints shall conform to AWWA C-301, rubber gasket shall be a special rubber designed to resist hardening and disintegration from contact with sewage and water. The ring shall fit over the spigot end of the pipe and securely lock into place. If rubber gaskets are not to be used in a short period of time, they are to be stored in a cool dark place away from the sun, electric motors, oil and grease.

3.0 PVC Pipe - General

Pipe shall be homogenous throughout and free from cracks, holes, foreign inclusions or other injurious defects. Pipe shall be uniform as practicable in: color, opacity, density and any other physical property. Impact resistance testing shall be in accordance with ASTM Test Method D-2444.

Routine inspection, sampling and testing shall be performed during pipe and fitting production to assure a product quality which exceeds the minimum requirements stated herein. Certificates of Conformance to verify conformance with the standard specifications for pipe and accessories shall be submitted by the manufacturer for approval prior to installation.

4.0 PVC Pipe for Gravity Sanitary Sewers

Polyvinyl chloride (PVC) sewer pipe for gravity sanitary sewers is approved for 6-inch through 24-inch diameter. Large diameter (greater than 12-inch) pipe may be used only with the approval of the Engineer. All pipe and fittings shall conform to ASTM designation D-3034, Type PSM. PVC pipe shall be standard dimension ratio (SDR) 26 for excavation depths of four (4) to twenty (20) feet. PVC sewer pipe shall not be laid in depths greater than twenty (20) feet.

Pipe shall be legibly marked at intervals of 5 feet or less with: pipe size, manufacturer's name or trademark and SDR-26 PVC sewer pipe, ASTM D-3034.

Pipe shall be available in approximately 13.0 foot laying lengths.

Pipe installation and bedding shall be in accordance with Section 035 of these specifications.

4.1 Joints for PVC Gravity Sanitary Sewers

All joints for PVC gravity sanitary sewers shall conform to ASTM standard D-3212 and have flexible elastomeric seals.

5.0 PVC Pipe for Force Main Sewers

Plastic pipe in sizes 4 inches through 12 inches shall consist of Ethyl Bell: Ring Poly Vinyl Chloride (PVC) Plastic Pipe or approved equal. PVC pipe shall conform to the Dimension Ratio (DR) and Pressure Class (PC) specified. All PVC force main shall conform to AWWA C900.

Pipe shall be joined by means of a rubber gasket bell joint. The rubber gaskets used for the joints of plastic pressure pipe shall consist of flexible elastomeric material conforming to ASTM D3139 and ASTM F477. The Manufacturer shall approve the lubricant used for joining the pipe and fittings.

Pipe installation and bedding shall be in accordance with Section 035 of these specifications.

5.1 Fittings for PVC Force Main Sewers

All fittings for PVC force main sewers shall be mechanical joint gray or ductile iron class 250 minimum. (See also below, Joints for Ductile Iron Pipe).

6.0 Restrained Joint PVC Pipe

Restrained joint PVC pipe may be used for gravity sanitary sewers and force main sewers.

Restrained joint PVC pipe, and sweeps, shall be used where specified, or where shown on the drawings. Restrained joint PVC pipe shall conform to AWWA C900. The pipe shall be CERTA-LOK C900/RJ, as manufactured by Certainteed Corporation, or approved equal. The class used shall be 150, with a dimension ratio (DR) of 18, and the size shall meet the minimum requirements for the inside diameters indicated on the drawings. In the performance of this project, the minimum inside diameter shall be eight inches.

Pipe installation and bedding shall be in accordance with applicable sections of these specifications.

7.0 Ductile Iron Pipe

Ductile iron pipe may be used for gravity sanitary sewers and force main sewers.

Ductile iron pipe and fittings for sanitary sewers shall meet the requirements of ASTM Specification A746. The class thickness for pipe diameters of four (4) inches through sixty (60) inches shall be determined by using a Type 4 laying condition and Class 1 Bedding as specified by ASTM D2321. The thickness of ductile iron pipe shall be in accordance with ANSI/AWWA C150/A21.50.

Ductile iron pipe used in pressure applications shall conform to ANSI /AWWA C151/A21.51.

All ductile iron pipe and fittings shall be cement lined.

Under corrosive conditions, and when required by the Engineer, a special lining shall be provided for ductile iron pipe to prevent deterioration due to sulfuric acid. The lining shall be either a Protecto 401 ceramic epoxy lining or Polybond Plus polyethylene lining, as manufactured by American Cast Iron Pipe Company, or an equal approved before the opening of bids.

Pipe installation and bedding shall be in accordance with Section 035 of these specifications.

7.1 Joints for Ductile Iron Pipe

Joints for ductile iron pipe may be of the mechanical or push-on type meeting the requirements of ANSI/ AWWA C111/A21.11. The joint and fittings shall have the same pressure rating as the pipe of which it shall join and be cement lined.

8.0 High Density Polyethylene Pipe

High-density polyethylene (HDPE) pipe may be used for gravity sanitary sewers and force main sewers. Medium-density polyethylene (MDPE) pipe shall not be allowed. The sizing of HDPE pipe shall be in accordance with ASTM F714 and shall be based upon the DIPS, outside diameter sizing system. The dimension ratio (DR) of pipe to be installed shall also be either shown on the drawings or as directed by the Engineer.

All HDPE pipes shall be of virgin material. No recycled materials, except that obtained from the manufacturer's own production of the same formulation, shall be used. Resin compounds used in the manufacture of HDPE pipe shall be in accordance with the requirements of ASTM D3350. The cell classification of HDPE pipe used for both gravity sewers and force mains shall be PE315333C unless specified otherwise by the Engineer.

Pipe will be legibly marked in accordance with those requirements specified in ASTM F714. The pipe shall not be marked using the standard thermoplastic pipe materials designation code. Pipe not marked as directed will be rejected.

HDPE pipe lengths shall be as from the manufacturer. Lengths shall be such that the pipe is easily transportable in accordance with both the manufacturer's recommendations and all applicable laws and regulations. Lengths shall be such that safe storage on the project site(s) is achievable without unacceptable traffic disruptions, disruption to local residents and either damage to pipe or to existing development. Additionally, lengths shall be such that they are easily and properly handled, joined together using butt-

fusion techniques and installed.

Site storage shall be in accordance with manufacturer recommendations.

Pipe installation shall be in accordance with the manufacturer's recommendations and Sections 035, 071 and 079 of these specifications. Any discrepancy between manufacturer's recommendations and these specifications shall be brought to the attention of the Engineer before installation for resolution. Testing of installed HDPE pipe shall be in accordance with both Section 039 of these specifications and ASTM F714.

Connections to HDPE pipe shall be made using sewer tapping methods in accordance with Section 031 of these specifications.

Connections to new manholes shall be made using press seal boots unless otherwise specified by the Engineer.

8.1 Joints for High Density Polyethylene Pipe

Joints between mainline HDPE pipes shall be constructed by using butt fusion techniques in accordance with ASTM specification D2657. The recommendations of the pipe manufacturer shall govern the fusion process, including the specification of the ideal temperature for fusion. Fittings shall not be joined to mainline piping using heat fusion joining techniques.

After the fusion process has been completed, beads and excessive cooled HDPE materials near pipe joints shall be removed using an internal bead remover for the purpose of reestablishing a smooth internal pipe wall. The internal bead remover shall be either the Bead Trimmer Two II, as manufactured by R & L Manufacturing, Inc., or the Internal Bead Remover, as manufactured by McElroy Manufacturing Inc., or an equal approved by the Engineer before the date of bid opening.

END OF SECTION