

SECTION 2: MATERIALS

Section 2.01 Sewer Pipe and Fittings:

- A. Sewer pipe and fittings shall be as designated in the Special Provisions, in the Proposal, or shown on the plans, and shall meet the appropriate specification as specified below.
- B. A certificate of compliance signed by the manufacturer of the material or the manufacturer of assembled materials may be required to be furnished to the District. The certificate shall state that the materials involved comply in all respects with the requirements of these specifications.
- C. All pipe, fittings and materials furnished by the Contractor shall be new, high grade, free from defects and shall be clearly marked with the name or trademark of the manufacturer.
 - 1. Vitrified Clay Pipe
 - a) Vitrified clay pipe and fittings shall conform to and meet all of the requirements of ASTM Designation: C700, Standard Specification for Vitrified Clay Pipe, Extra Strength, Bell and Spigot and shall conform to all data contained in the Materials Section of the current Clay Pipe Engineering Manual published by the National Clay Pipe Institute. (Approved for construction of trunk sewers, collector sewers, and lower and upper laterals unless otherwise specified by the District).
 - b) Joints in vitrified clay pipe shall be a factory applied resilient-type plastic compression type that conforms to ASTM Designation: C425.
 - c) All joints shall be tight fitting, watertight, and without imperfections.
 - 1) Only manufacturer recommended lubricants shall be used.
 - d) Compression couplings for plain end pipe shall conform to ASTM Designation: C 425 and C 1173 for molded rubber sleeve and A 240 for stainless steel bands and nuts, and shall be the adjustable repair type coupling. Couplings shall be Mission Rubber Co., “ARC Stainless Steel Shear Ring” or approved equal.
 - e) The pipe shall not deviate from a straight line by more than 1/16 inch per foot.
 - f) Imperfections in pipe and fittings containing blisters, cracks or chips shall be adequate cause for rejection.
 - 2. Ductile Iron Pipe

- a) Ductile iron pipe for sewers shall conform to ANSI/AWWA Standard C151/A21.51 requirements. (Approved for construction of trunk sewers, collector sewers, and lower and upper laterals unless otherwise specified by the District).
- b) Ductile iron fittings and special fittings shall conform to ANSI/AWWA Standard C110 requirements.
- c) Flanged ductile iron pipe and fittings shall conform to ANSI/AWWA Standard C115 requirements.
- d) Ductile iron pipe shall be pressure Class 150 minimum unless otherwise shown on the plans.
- e) Joints for ductile iron pipe shall be either mechanical joints or push-on joints conforming to ANSI/AWWA standard C111 requirements or flanged joints conforming to ANSI/AWWA standard C110 or C115 requirements.
- f) Asphaltic outside coating shall be in accordance with ANSI/AWWA C151/A21.51 and ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53 for fittings.
- g) Ductile Iron pipe shall be ceramic epoxy lined pipe and shall have a nominal lining thickness of 40 mils and shall be U.S. Pipe “PROTECTO 401” or approved equal.

3. PVC / SDR 26 Pipe

- a) PVC pipe and fittings shall be solid-wall and made of compounds conforming to ASTM D1784 and in accordance with ASTM D3034 or ASTM F679 and ASTM D1784 in physical, dimensional and chemical requirements. (Approved for construction of 6-inch and/or 8-inch collector sewers and lower and upper laterals when authorized in writing by the District, and only for independent (“stand-alone”) residential subdivisions).
- b) Joints shall be elastomeric gasketed, bell-and-spigot joints, push-on type providing a watertight seal.
- c) Pipe stiffness shall equal or exceed 115 lbs / in-in.
- d) PVC gravity sewer pipe shall conform to ASTM D3034 SDR 26 for diameters up to eight inches (8”).
- e) The standard laying length shall be 20 feet (20’) (plus/minus) 1-inch.

4. ABS / Schedule 40

- a) Pipe and fittings shall be made in conformance with ASTM D2661-08. (Approved for construction of upper lateral only).
 - b) Joint cement shall be as approved by the manufacturer.
5. PVC / Schedule 40
- a) Pipe and fittings shall be made in conformance with ASTM D1785 – 06. (Approved for construction of ejector system force main only).
 - b) Joint cement shall be as approved by the manufacturer.
- D. All service connections shall be installed with “WYE” fittings. Solvent welded saddles are prohibited. Lubricant shall be as recommended by the pipe manufacturer.

Section 2.02 Pipe Fittings and Miscellaneous Pipe Facilities:

- A. All pipe fittings and joints, including the maximum deflection of joints in curved alignments, shall be in accord with accepted best practice. Care shall be used to prevent chipping, cracking, or deformation of either end of the pipe during installation. Adjacent pipes at each joint shall be concentric. Maximum allowable eccentricity is one percent of pipe I.D. or 3/16 inch, whichever is greater. Greater eccentricity shall be corrected.
- 1. Transition Joints
 - a) When approved for use by the District, transition joints between different pipe materials shall be "Band-Seal", Shear Ring, molded transition style or other approved flexible coupling.
 - b) Where necessary, proper adapters shall be used.
 - 2. Pipe to Manhole Connector
 - a) Pipe to manhole connector shall be integral to the base and shall be flexible speed seal type connection.
 - b) The use of flexible rubber connector (boot) is not permitted, except for use on manhole barrel sections, cored for the installation of a drop connection, when approved by the District.
 - 3. Pipe fittings
 - a) All fittings used shall be specifically designed, approved or recommended by the manufacturer for use in handling sewer or for the purpose intended.

- b) Fitting material shall match pipe material unless otherwise permitted by the District.
- c) Mechanical joints shall not be used unless approved by the District.

4. Locating Cable

- a) Where specified, locating cable shall be laid 6" over pipe or secured to non-metallic pipe. Locating cable shall be direct burial, copper, No. 10 insulated. The cable shall be procured from the vendor complete with an approved epoxy splice kit and all joints shall be spliced in accordance with manufacturer's recommendations to form a continuous run the entire length of the line as specified.

5. System Plugs

- a) All plugs used shall be of the mechanical type and specifically designed, approved or recommended by the manufacturer for the purpose intended.

Section 2.03 Conductor Pipe:

- A. Unless otherwise specified on the plans, by supplemental drawings, or by permit, steel casing shall be used in the jacking operation. The size (I.D) shall be as shown on the contract documents. In no case shall the thickness of the casing be less than 1/2". The Contractor shall be fully responsible for the sufficiency of the casing provided.

Section 2.04 Force Main Pipe:

- A. Pipe used in the construction of force mains shall be either: ductile iron, Protecto 401 or Poly Vinyl Chloride (PVC) Pipe, C900 and fittings shall conform to the requirements of the applicable sections of these specifications.
- B. Design head shall be as specified on the plans.
 - 1. Pressure rating of force main pipe shall be 150 per cent of design head, but in no case less than pressure class 150.
- C. Poly Vinyl Chloride (PVC) pipe used for sewer force mains shall be solid wall, hydrostatically tested and meet AWWA C-900 Standard Specifications for Polyvinyl Chloride (PVC) pressure pipe.

Section 2.05 Precast Reinforced Concrete Manholes:

- A. The standard size precast reinforced concrete manhole shall be 48-inch inside diameter. The manhole shall consist of cylindrical sections, concentric

tapered cones, and ring sections, all with tongue and groove joints. Larger manholes may be required as designated in the sewer design section.

- B. Manholes shall conform in materials and design to applicable portions of ASTM Designation: C478 with the exception that the cement shall be Type II, and a single-line circular reinforcement as specified for Class II, inner cage, shall be used. Wall thickness shall be a minimum of 4 inches for 48-inch manholes and 5 inches for 60 inch manholes or 1/12 times the inside diameter, whichever is greater.
- C. The internal diameter of manhole sections, cones, and rings shall not vary more than one percent from the nominal diameter. The wall thickness shall be not less than the nominal dimension by more than 3/16 inch for 48-inch manholes or more than 1/4 inch for 60 inch manholes. The single line reinforcement shall be placed within the center one-third of the wall. Manhole sections shall be manufactured without steps or rungs.
- D. The interior finish shall be sacked at the point of manufacturing to provide a smooth and void free surface.

Section 2.06 Sealing Compound:

- A. Preformed plastic sealing compound used for sealing joints shall meet Federal Specifications SS-S-00210 “Sealing Compound Preformed Plastic for Pipe Joints”, Type I, and shall be as manufactured by Henry Company (K. T. Snyder Co., Inc.) “Ram-Nek” or equal.

Section 2.07 Joint Wrap:

- A. Joint wrap shall be Henry Company Sealants Division “RUB’R-NEK” external concrete joint wrap (6” minimum width) or approved equal.

Section 2.08 Concrete:

- A. Concrete for manhole base material shall meet ASTM C94, Alternate 2 specifications and the following: Compressive strength of 2,500 psi at 28 days, maximum aggregate size 1 ½ inch, slump 4 inch maximum as determined by ASTM C143 (12” slump cone), cement ASTM C150, Type II, minimum cement content 564 pounds per cubic yard, water cement ratio of 0.49.

Section 2.09 Mortar:

- A. Mortar shall be standard premixed meeting ASTM C387, or proportioned 1 part Portland cement to 2 parts clean, well graded sand which will pass a 1/8 inch screen. Minimum compressive strength shall be 1,800 psi at 28 days.

- B. Admixtures may be included but shall not exceed the following percentages of the weight cement: 10 percent hydrated lime, 5 percent diatomaceous earth.

Section 2.10 Reinforcing Steel:

- A. Reinforcing steel shall meet ASTM A615, Grade 40, deformed bars.

Section 2.11 Liner Coating:

- A. The anti-corrosive product selected for the interior coating of any concrete structure shall meet the following characteristics:
 - 1. Highly resistant to corrosive conditions, especially hydrogen sulfide gases, and similar gases common to the wastewater industry.
 - 2. Suitable for application in a damp environment.
 - 3. Prohibits water penetration.
 - 4. Highly resistant to abrasion, impact and chemical attack.
 - 5. Non-supportive of bacterial growth.
- B. The following products, or approved equals, are acceptable for use if applied in strict conformance with the appropriate manufacturer's specifications:
 - 1. Hydro-Pox CT.04-204UHB distributed by Con-Tech of California Inc. or approved equal.
 - 2. Lafarge Calcium Aluminates, Inc – SewperCoat. 2000 HS Regular or approved equal.
 - 3. Ameron International T-Lock Protective Liner or approved equal.
- C. All horizontal surfaces shall be non-skid as specified by the manufacturer and approved by the District.
- D. Shop drawings, specifications, literature and other information shall be submitted to the District for review and approval prior to commencement of work. Shop drawings and manufacturer specifications shall detail the method of surface preparation, application, thickness, number of coats, inspection criteria and all pertinent data. No product shall be used without the District's approval.

Section 2.12 Manhole Frames and Covers:

- A. Manhole frames and covers shall conform to the following:

1. Manhole frame and cover sets shall be Cast Iron conforming to ASTM A-48 Class 35B. Each set shall be manufactured in the United States of America, shall be machined and the cover shall seat firmly into the frame without rocking or rattling and free from defects. The frames and covers shall be coated with a commercial quality black asphalt or bituminous paint. The foundry, heat, date and, country of origin marks in compliance with federal regulations, shall be cast in each frame and cover. The letter “S” or the word “SEWER” shall be cast in the cover.
 2. For 48-inch diameter manholes, frame and cover set shall be South Bay Foundry A 51, D & L Supply A-1021 or approved equal, 26” diameter covers with edge pry (EP) hole unless approved by the District.
 3. For 60-inch diameter and larger manholes, frame and cover set shall be South Bay Foundry SBF 1325 (3 Pc), D & L Supply A-1426 (3 Pc), bolt down, or approved equal.
 4. Bolt down covers with stainless steel bolts are required in unimproved areas per Sections 3.07 and 5.22 of these specifications or as directed by the District.
- B. Frames and covers not conforming to this specification may be rejected by the District.
- C. The frame and cover shall be made by the same manufacturer.