

---

## SECTION 2: MATERIALS

### 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 Fernco 1000 RC and/or 5000 RC Series couplings 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 Tnemec Series 431 Perma-Shield PL or approved equal.
3. Any linings or coatings damaged in the field from installation shall be repaired by cleaning to bare metal and touched up using manufacturer's repair kit to a 40-mil nominal coating. The District reserves the right to reject piping or fittings due to field or shipping damage of the protective coating system.
4. PVC / SDR 26 (PS 115) 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.
  - b) Joints shall be elastomeric gasketed, bell-and-spigot joints, push-on type providing a watertight seal.
  - c) Couplings for plain end pipe and/or repairs shall be of the heavy walled type Gasket X Gasket without stop "Slip/Slip without Stop".
  - d) Pipe stiffness shall equal or exceed 115 lbs / in-in.
  - e) PVC gravity sewer pipe shall conform to ASTM D3034 SDR 26 for diameters up to fifteen inches (15").
  - f) PVC gravity sewer pipe shall conform to ASTM F679 PS 115 for diameters eighteen inches (18") up to forty-eight inches (48").
  - g) The standard laying length shall be a minimum of 14-feet (14').

5. PVC / C900

- a) PVC pipe and fittings shall be solid-wall and made of compounds conforming to ASTM D1784 Cell Class 12454 and in accordance with ANSI/AWWA C900-16 and ASTM D1784 in physical, dimensional and chemical requirements.
- b) The gasket shall be reinforced with a steel band and meet the requirements of ASTM F477. Pipe shall have an integral bell end and shall meet the joint requirements of ASTM D3139.
- c) Pipe shall be provided in a green color.
- d) The nominal laying length shall be 20-feet (20').

6. ABS / Schedule 40 (Approved for construction of upper lateral only).

- a) Pipe and fittings shall be made in conformance with ASTM D2661-14e1. (
- b) Joint cement shall be as approved by the manufacturer.

7. DWV / Schedule 40 (Approved for construction of upper lateral only).

- a) Pipe and fittings shall be made in conformance with ASTM D2665-20
- b) Joint cement shall be as approved by the manufacturer.

8. PVC / Schedule 40 (Approved for construction of ejector system force main only).

- a) Pipe and fittings shall be made in conformance with ASTM D1785 – 15e1.
- b) Joint cement shall be as approved by the manufacturer.

D. All service connections shall be installed with “WYE” fittings.

E. Solvent welded saddles are prohibited unless approved by the District

F. Lubricant shall be as recommended by the pipe manufacturer.

**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 accordance 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 Fernco 1000 RC and/or 5000 RC Series couplings or approved equal.
- b) Where necessary, proper adapters shall be used.

2. Pipe to Manhole Connector

- a) A minimum structural leg of six inches of concrete (as measured on the interior wall of the manhole structure) shall be provided/maintained between pipe penetrations.
- b) Pipe to manhole connector shall be integral to the base and shall be a cast in gasketed bell or gasketed fitting as approved by the District.
- c) 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. Warning Tape

- a) Warning tape shall be installed approximately 1-foot above the pipe after initial backfill is placed and shall run continuously along the length of the pipe and all related appurtenances.
- b) Warning tape shall be green and state “CAUTION: SEWER LINE BURIED BELOW”.
- c) The tape shall be 6” wide and consist of a minimum 5.0 mil, five-ply 100% virgin polyethylene which is acid, alkaline and corrosion resistant. Elongation

and tensile strength of not less than 7,800 PSI shall be in accordance with ASTM D882-80A.

6. 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.

**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.

**2.04 Force Main Pipe:**

- A. Pipe used in the construction of force mains shall be either: ductile iron with approved lining, or Poly Vinyl Chloride (PVC) Pipe C-900. 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 percent of design head.
- 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. In all cases, PVC C-900 shall have a minimum dimension ratio of 18 (DR18).
- D. Joint restraints shall be designed by the Design Engineer and specified on the plans.

**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.

#### **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.

#### **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.
- B. A manufacturer approved primer shall be used prior to application of the joint wrap.

#### **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.

#### **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.

#### **2.10 Reinforcing Steel:**

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

#### **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, and testing procedures:
1. Hydro-Pox CT.04-204UHB distributed by Con-Tech of California Inc. or approved equal.
  2. Kerneos, 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.

## **2.12 Manhole Frames and Covers:**

- A. Manhole frames and covers shall conform to the following:
1. Cast Iron
    - a) 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 be 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.
    - b) 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.
    - c) 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.

- d) 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.

## 2. Composite

- a) Composite manhole frames, covers and risers shall be heavy duty rated for AASHTO H20 highway loading and shall be designed, manufactured, and tested with a 40,000 lb. proof load test in accordance with AASHTO M306. A report from an independent test laboratory shall be provided. Each set shall be manufactured in the United States of America and at a minimum be marked with the following: name of the manufacturer, country of manufacture, material designation, individual part number, and the letter “S” or the word “SEWER” on the cover.
- b) For 48-inch diameter manholes, frame and cover set shall be EJ GMI 2600 Durostreet, confined space entry with 2-1/4 turn Titus TwistLift latches and 24” clear opening or approved equal.
- c) For 60-inch diameter manholes, frame and cover set shall be EJ GMI 3800 Durostreet, confined space entry with 2-1/4 turn Titus TwistLift latches and 36” clear opening or approved equal.
- d) There shall be no possibility of corrosion welding between the cover and frame. Gasket systems shall be integrated to reduce traffic shock and abatement of noise and malodors.
- e) Static Coefficient of Friction shall conform to ASTM C1028, in both wet and dry applications.
- f) The installation of composite manholes requires District approval.

B. Frames and covers not conforming to this specification will be rejected by the District.

C. The frame and cover shall be made by the same manufacturer.

### 2.13 Controlled Low Strength Material:

- A. Controlled Low Strength Material (CLSM): A highly flowable, lean concrete mix consisting of a mixture of cement, fly ash, densely graded mineral aggregates, water and admixtures. Characteristics include:
  - 1. Capable of freely flowing to fill excavations and voids without compaction or other additional effort.
  - 2. Used in trenches and for backfill adjacent to structures where clearance is limited, and in other areas specifically identified on drawings or specified.
  - 3. Low permeability to prevent migration of adjacent fines in the set mix.
  - 4. Easily excavated after curing with minimum risk of damage to buried utility.



- B. Furnish and install temporary excavation support systems, including sheeting, shoring and bracing, to insure the safety of personnel and protect adjacent structures, piping, etc, in accordance with Federal, State and local laws, regulations and requirements.
- C. All materials shall conform to the following American Society for Testing and Materials (ASTM)
  - 1. ASTM C31 — Standard Practice for Making and Curing Concrete Test Specimens in the Field.
  - 2. ASTM C143 — Standard Test Method for Slump of Hydraulic-Cement Concrete.
  - 3. ASTM C150 — Standard Specification for Portland Cement
  - 4. ASTM C403 - Standard Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance.
  - 5. ASTM C618 — Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
  - 6. ASTM D4832 - Standard Test Method for Preparation and Testing of Controlled Low Strength Material (CLSM) Test Cylinders.
  - 7. ASTM D6023 - Standard Test Method for Density (Unit Weight), Yield, Cement Content, and Air Content (Gravimetric) of Controlled Low-Strength Material (CLSM).
- D. Mix Design: At least 10 days before placing CLSM, identify name and/or number of the mix design. Provide the proportions and gradations of materials proposed for CLSM. The mix design shall include trial laboratory and testing data with cylinder breaks performed at 7, 14, and 28 days.
- E. No CLSM shall be placed until the mix design has been approved. Approval of the mix design shall be understood to indicate conditional acceptance. Final acceptance will be based on tests conducted on field samples and conformance with these Specifications.
- F. CLSM Mix: A mixture of Portland cement, fly ash, aggregate, water, and admixtures that produce a material of controlled density and of low compressive strength capable of filling all spaces between the pipe, the bedding, and the trench walls.
- G. Materials:
  - 1. Cement: Conforming to ASTM C 150, Type II or III with total alkali content not more than 0.8 percent.
  - 2. Water: Clean, potable water containing less than 500 ppm of chlorides.
  - 3. Fly Ash:
    - a) Mix Designs used for pipe bedding and backfill: Class C in conformance with ASTM C618.

- b) Mix Designs used for backfill of excavations: Class F in conformance with ASTM C618.

4. Aggregate Materials

- a) Densely graded rock conforming to the following gradation:

| Sieve Size | Percentage passing |
|------------|--------------------|
| 1"         | 100                |
| No. 8      | 50-100             |
| No. 200    | 0-5                |

## SECTION 3: DESIGN

### 3.01 Sanitary Sewer System Design Standards:

- A. These design criteria shall govern the engineering design of Public sanitary sewer projects which will be dedicated to South Placer Municipal Utility District, and private sewer systems requiring District approval.

### 3.02 Average Flow Determination:

- A. Flow determination shall be based upon the most recent zoning. The minimum population density used shall be equivalent to that of single-family zoning. The area shall be examined for trends toward population concentration and, if found, an estimate should be made of the probable extent of such concentration. This estimate shall be used as a basis for determining flow.

1. Single Family and Duplex Units

- a) Flow shall be based on 4 persons per residential unit, 100 gallons per person per day, and 4 lots per acre. However, if the number of units is known, and is greater than 4, the actual number shall be used.

2. Single Family, Planned Unit Development

- a) Flow per unit shall be the same as above and the actual number of units per acre shall be considered. However, in the absence of known data, the density shall be assumed to be 12 units per acre.

3. Commercial and Multiple Residential

- a) Flows shall be determined from the curves on Standard Drawing No. 1. However, if the type of planned improvements are known and estimated discharges are available, they shall be used in the design, subject to the approval of the District.
- b) Multiple residential is differentiated from planned unit developments in that the latter contain individually owned residences with the adjacent land owned in common and with maintenance performed by a homeowner's association.
- 1) Multiple residential is designed to be owned by one party with the individual residences rented or leased.
- 2) The average flow from single bedroom multiple residential units shall be 200 gallons per day per unit; from 2-bedroom units, 300 gallons per day; and from 3 or more bedroom units, 400 gallons per day.
- 3) Mobile home flow shall be 300 gallons per day per unit.