

## **SECTION 32: SANITARY SEWER INSTALLATION**

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**32-01 SCOPE.** The Work shall consist of furnishing and installing sewer mains, manholes, laterals, cleanout fittings and appurtenances; and testing, flushing and cleaning the same in accordance with the Plans and these Standard Provisions.

### **32-02 MATERIALS.**

**32-02.01 Vitrified Clay Pipe.** Vitrified clay pipe and fittings shall be bell and spigot, unglazed, extra strength, conforming to ASTM C700, as amended to date.

**32-02.02 Polyvinylchloride Pipe.** Polyvinylchloride pipe and fittings shall be bell and spigot, conforming to ASTM D3034 (SDR 26) for diameters from four inches (4") through fifteen inches (15") and ASTM F679 for diameters from eighteen inches (18") through twenty- four inches (24"), as amended to date.

**32-02.03 Vitrified Clay Pipe Joints.** Vitrified clay pipe joints shall be of the resilient preformed type conforming to ASTM C425, as amended to date, except that rubber sleeve (Band-Seal) couplings will not be allowed in new main or new lateral installation.

**32-02.04 Polyvinylchloride Pipe Joints.** Polyvinylchloride pipe joints shall be bell gasketed joints. Gaskets shall meet the requirements of ASTM F477. The joints shall meet the requirements of ASTM D3212.

**32-02.05 Precast Manhole Sections and Castings.** These items shall conform to Section 31, "Storm Drain Installation," of these Standard Provisions.

**32-02.06 Standard Sewer Main Cleanouts.** Standard sewer main cleanouts built in accordance with the Standard Details shall be installed where shown on the Plans.

**32-02.07 Sewer Laterals and Cleanouts.** Sewer laterals and cleanouts shall be constructed of materials specified in the Standard Details. Sewer lateral cleanouts shall be the same size as the sewer lateral.

**32-02.08 Portland Cement, Portland Cement Concrete and Mortar.** These items shall conform to Section 31, "Storm Drain Installation," of these Standard Provisions.

## **32-03 CONSTRUCTION METHODS.**

**32-03.01 Handling of Materials.** Vitrified clay pipe, polyvinylchloride pipe, fittings, precast concrete manhole sections, and cast iron frames and manhole covers must be carefully handled at all times. Only suitable and proper equipment and appliances shall be used for the safe loading, hauling, unloading, handling and placing of all materials. Special care shall be exercised so that the preformed resilient joints on pipe and fittings will not be damaged. Any pipe or fitting with a joint damaged or flattened will be rejected.

**32-03.02 Trenching.** Trench excavation, shoring, grade control, backfill and resurfacing shall conform to Section 24, "Trench Excavation, Backfill and Resurfacing," of these Standard Provisions.

**32-03.03 Pipe Laying.** Pipe laying shall proceed upgrade with the spigot end of bell and spigot pipe pointing in the direction of flow. Each pipe shall be laid true to line and grade and in such a manner as to form a close, concentric joint with the adjoining pipe and to prevent sudden offsets in the flow line. As the work progresses, the interior of the sewer shall be cleaned of all dirt and debris. Pipe shall not be laid when the condition of the trench or the weather is unsuitable. When Work is not in progress, open ends of pipe and fittings shall be plugged. As pipe laying proceeds, bell holes shall then be excavated at each joint to facilitate the jointing operations and shall be only of sufficient size for that purpose.

**32-03.04 Manholes.** Manholes shall be located as shown on the Plans and installed in accordance with the Standard Details. When a manhole is constructed over an existing sewer main, City Inspector shall be present when the Contractor makes the cut into the existing main.

**32-03.05 Cleanouts.** Cleanouts on mains and laterals shall be installed in accordance with the Standard Details.

**32-03.06 Sewer Laterals.** Sewer laterals shall be installed in accordance with the Standard Details. All taps into existing sewer mains shall be made by machine taps ("Tap Tite"), or, for VCP only, utilize Mission Clay insertion wye with Band-Seal fittings. Stamp or grind an "S" on the curb face where a sewer lateral crosses under the curb if no "S" currently exists.

### **32-03.07 Testing Sewer Lines.**

**a. Exfiltration/Infiltration Testing.** Sewer pipe joints and manholes shall be so watertight that leaking into the sewer by groundwater infiltration shall not exceed 0.039 gallons per minute, per inch diameter, per one thousand feet (1,000') of main line sewer and sewer laterals being tested. The measure of the infiltration shall be defined as the exfiltration out of the pipeline when the lower end is

plugged at the manhole and the upper end is filled at a manhole so as to create a hydrostatic head in the line of a minimum four feet (4') and a maximum five feet (5') above the invert at the upper end of the line. If groundwater is encountered, the head above the invert of the pipe at the upper end of the line shall be increased so that the net hydrostatic head shall be a minimum of four feet (4') and a maximum of five feet (5'). The amount of exfiltration in one (1) hour measured through a water meter or other convenient device by bringing the water level back up to the starting level at the upper manhole shall determine the rate of exfiltration. The Contractor shall furnish and install the necessary and required plugs for the tests. The length of the laterals entering the section of main line being tested shall be included.

**b. Air Testing.** Air testing of sewer mains may be allowed in lieu of exfiltration/infiltration testing.

Air testing of vitrified clay pipe shall be in accordance with ASTM C-828, "Standard Test Methods for Low-Pressure Air Test of Vitrified Clay Pipe Lines." Air testing of PVC pipe shall be in accordance with the requirements specified in the most current Uni-B-6 pamphlet, "Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe" issued by the Uni-Bell PVC Pipe Association or as per the pipe manufacturer's specifications. At the approval of the Engineer, air testing of HDPE pipe installed by pipe-bursting method may be in accordance with the most current Installation Test Standard IS-16 issued by the International Association of Plumbing and Mechanical Officials.

**c. Acceptance.** During the testing and flushing operation, a wire screen with a one-quarter of an inch (1/4") mesh or smaller shall be placed over the downstream outlet of the lower manhole to prevent any debris from being washed into the existing sewer system.

In no case shall the Contractor place the newly constructed sewer in operation without the approval of the Engineer.

In the event that infiltration or leakage exceeds the limits indicated above, the Contractor shall, at his own expense, immediately proceed to make necessary repairs, and no further payment shall be allowed, nor shall the project be finally accepted, until the tests indicate that the entire project meets the above requirements.

The Contractor shall furnish the necessary pumps, water, labor, equipment and materials and shall assist the Engineer in making tests of the completed sewerage project before the system is placed in operation or connected to other lines.

The Engineer shall designate the length or section of the sewer to be tested and may approve portions or all of the project without testing.

**32-03.08 Flushing and Cleaning Sewer Lines.** After all backfilling and pavement restoring operations have been completed, the Contractor shall flush and clean all sanitary sewer lines in the following manner, under the supervision of the Engineer or Inspector:

A heavy rubber ball, such as "MacWane Ball," manufactured by Sidu Company, Long Beach, California, or approved equal, inflated with air, and having an outside diameter equal to the interior diameter of the pipe to be cleaned, shall be furnished by the Contractor. The ball shall be inflated so that it will fit snugly into the sewer line. The ball shall be placed in the last (upper) manhole on the line and water introduced into the manhole back of the ball. The ball shall pass through the pipe with only the pressure of the water behind it. The rate at which the ball is allowed to pass through the pipe shall be controlled by a rope at all times. Debris flushed ahead with the ball shall be removed at the lower manhole where its presence is evident. This cleaning shall be conducted on each section of pipe installed. Care shall be exercised not to feed the ball too rapidly in order that all debris can be removed at each manhole.

During the flushing and cleaning operation, a wire screen with a one-quarter of an inch (1/4") mesh or smaller shall be placed over the downstream outlet of the lower manhole to prevent any debris from being washed into the existing sewer system.

**32-03.09 Television Inspection.** After completion of the pipe installation, service connections, flushing and cleaning, the sewer line shall be televised with a color closed-circuit television with tilt-head camera recorded in VHS format. The original videotape and log sheets shall be provided to the Engineer.

**32-03.10 Abandoning Existing Sewer Mains.** The existing sewer main to be abandoned shall be cut a minimum of twelve inches (12") clear of the manhole and abandoned in place at the location shown on the Plans after the new sewer is installed. The main shall be filled with sand and ends plugged with a minimum of six inches (6") of Portland cement concrete at each required cut.

#### **32-04 MEASUREMENT.**

**32-04.01 Sewers.** Sewers shall be measured horizontally by the linear foot. The measured distance for payment shall be the total distance along the centerline of the pipe, including all connections, less the design distance between the ends of the pipe in manholes through which the pipe does not pass. Whenever split pipe is required through a manhole, such pipe shall be included in the measurement.

**32-04.02 Sewer Lateral.** Sewer laterals shall be measured horizontally by the linear foot from the centerline of the main sewer to the end of the lateral, and shall include all fittings and connections.

**32-04.03 Manholes.** Manholes shall be measured as one complete installed unit, including base, precast sections, frame and cover.

**32-04.04 Standard Sewer Main Cleanout.** Standard sewer main cleanout shall be measured as one complete installed unit, including frame, cover and pipe.

**32-04.05 Sewer Lateral Cleanout.** Sewer lateral cleanouts shall be measured as one complete unit, including fittings, cleanout plug, box, cover (including metal traffic cover where required on the Plans or in the Special Provisions) and pipe.

**32-04.06 Trench Surfacing.** Trench surfacing shall not be measured for payment and shall be considered paid for under various items of Work.

**32-04.07 Rechanneling Manhole Bases.** Rechanneling manhole bases and breaking into manholes shall not be measured for payment and shall be considered as paid for in the various items of Work.

**32.04.08 Television Inspection.** Television inspection shall not be measured for payment and shall be considered paid for in the various items of Work.

**32.04.09 Abandoning Existing Sewer Mains.** Existing sewer main pipelines to be abandoned shall be measured as one complete unit, including concrete for both ends.

## **32-05 PAYMENT.**

**32-05.01 Sewer Main.** The price per linear foot of sewer main shall include all wye branches and connections shown on the drawings; all labor, materials and pipe necessary to excavate the trench, bed, place and joint the pipe; backfill the trench; flushing, cleaning, testing and televising; all other work necessary to produce a complete and finished job, as required in the Special Provisions, shown on the Plans and specified herein.

**32-05.02 Sewer Lateral.** The price per linear foot of sewer lateral shall include one-eighth (1/8) bends, pipe, connections to main line sewer and all labor and materials necessary to excavate the trench, bed, place and joint the pipe; backfill the trench; and all other work necessary to produce a complete and finished job as required in the Special Provisions, shown on the Plans and specified herein.

**32-05.03 Manhole.** The Contract unit price paid for each manhole shall include full compensation for all labor, materials, tools and equipment, and for doing all Work, including excavation, backfill, compaction and resurfacing, as required in the Special Provisions, shown on the Plans and specified herein.

**32-05.04 Standard Sewer Main Cleanout.** The Contract unit price per each "Standard Sewer Main Cleanout" shall include full compensation for all labor, materials, tools and equipment and for doing all Work necessary and incidental to furnishing and installing a cleanout complete as required in the Special Provisions, shown on the Plans and specified herein.

**32-05.05 Sewer Lateral Cleanouts.** The Contract unit price per each sewer lateral cleanout shall include full compensation for wye branch, one-eighth (1/8) bend, riser, iron body cleanout with plug, box and lid, connection to lateral, labor, materials, tools and equipment, excavation, backfilling and resurfacing, required in the Special Provisions, as shown on the Plans and specified herein.

**32-05.06 Abandoning Existing Sewer Mains.** The Contract unit price for each sewer main pipeline that is abandoned shall constitute full compensation for all Work and materials required to complete the abandonment of the sewer main as required in the Special Provisions, shown on the Plans and specified herein.