

SECTION 13 STORM DRAINAGE

13.01 PURPOSE

This work shall include the furnishing of all labor, materials, tools, equipment, and incidentals to construct and complete in an efficient and workmanlike manner the installation of the storm drainage system in accordance with the approved plans, these City Standard Construction Specifications and Standard Details.

13.02 DEFINITIONS

A. PIPE

1. Reinforced Concrete Pipe (RCP) shall conform to the specifications of ASTM Designation C76 and shall be Class III, IV or V rubber gasket type, unless otherwise specified on the plans. Reinforcing shall be the minimum requirements for circular reinforcing wire mesh cages as specified in ASTM Designation C76. Portland Cement used in the manufacture of reinforced concrete pipe shall conform to the requirements of the specifications for Type II Portland Cement, ASTM Designation C150. All joints and gaskets shall conform to ASTM Designation C443.

The minimum allowable Class of RCP shall be Class III for depths from two (2) feet to twenty-eight (28) feet defined as the distance from the inside top of pipe to the top of finished grade. RCP which lies wholly or partially within the structural section of a roadway shall be Class V.

Tests on reinforced concrete pipe shall be required to determine conformance with “D” load and reinforcing requirements of these specifications.

Pipe samples for testing shall be furnished, without charge, by the Contractor one week in advance of construction. The cost of testing the pipe shall be borne by the Contractor. One section of pipe from each lot to be used shall be tested in accordance with the procedures outlined in ASTM C76. Lots tested shall be marked with the date made as well as by lot number for shipment to the specific project for which that lot has been tested. Any pipe arriving on the job without the appropriate markings shall be rejected and sent back to the supplier until such lot or lots can be tested and accepted for use.

In lieu of the above testing of reinforced concrete pipe, the Contractor may submit to the City Engineer the manufacturer’s “Certificate of Compliance” guaranteeing the requirements of ASTM C76.

2. Polyvinyl Chloride (PVC) Pipe and Fittings shall at a minimum, conform to one of the following specifications:

Diameter

Specifications:

8 inches thru 15 inches
18 inches thru 27 inches
30 inches thru 48 inches

ASTM Designation: D 3034, SDR 35
ASTM Design: F794 or F2241, SDR 51
ASTM Designation: F794, SDR 51

Polyvinyl Chloride Pipe joints shall be bell and spigot using an elastomeric gasket, which meets the requirements of ASTM Designation F477. The pipe shall have a stop indicated on the barrel or other approved means to accurately position the pipe end in the joint. No solvent weld joints will be allowed.

Connections to manholes drop inlets or other concrete structures shall be made by utilizing manhole adapters or elastomeric seal rings embedded in the concrete.

A written guarantee, warranting ASTM Designation F794 pipe against failure until such time as the pipe may be accepted by the California Department of Transportation shall be furnished to the City by the pipe manufacturer. The guarantee shall include all costs of removing and replacing any failed pipe. Damage caused by construction or maintenance operations may be excluded from the guarantee.

Maximum allowable deflection (reduction in vertical inside diameter) of the installed pipe shall be five (5) percent. On pipes twenty-one (21) inches in diameter and smaller, the Contractor shall furnish a properly sized “go, no-go” mandrel, deflectometer, or other approved devices, to check the pipe for maximum allowable deflection. Said mandrel or other device shall be provided to the City Engineer for review and approval prior to initiating deflection testing. For pipes larger than twenty-one (21) inches in diameter, deflection may be determined by other means approved by the City Engineer. At any location where the deflection is determined to be excessive, the City Engineer may require the Contractor to remove, re-bed, and if required, replace the pipe. The City Engineer may require certification from the manufacturer that the test results comply with specification requirements. The pipe shall have a home mark to indicate full penetration of the spigot when a joint is made. The date of manufacture shall be marked on the pipe. The pipe being installed shall have been manufactured within twelve (12) months of the date of installation.

3. High-density Polyethylene Pipe (HDPE) and High-density Polypropylene Pipe (HDPP) and Fittings (up to and including sixty (60) inches shall conform to the State Standard Specifications Sections 64-2.02C or 64-2.02E.

All joints shall be bell and spigot meeting AASHTO M294 and MP6-95. The bell and spigot joint shall be watertight according to the requirements of ASTM D 3212. Gaskets shall be made of polyisoprene meeting the requirements of ASTM F477 with the addition that the gaskets shall not have any visible cracking when tested

according to ASTM D1149 after seventy-two (72) hour exposure to fifty (50) PPHM ozone at one hundred four (104) degrees Fahrenheit.

Fittings shall conform to AASHTO M294 and MP6-95. Fabricated fittings shall be welded on the interior and exterior at all junctions. Pipe deflection shall conform to the manufacturer's recommendations. At any location where the deflection is determined to be excessive, the City Engineer may require the Contractor to remove, re-bed, and if required, replace the pipe.

Installation shall be in accordance with ASTM D2321 and in conformance with the manufacturer's requirements. Connections to manholes, drop inlets or other concrete structures shall be watertight. The openings around the pipe shall be in accordance with the manufacturer's recommendations or sealed with a stiff mix of concrete mortar thoroughly compacted, subject to approval by the City Engineer. The mortar shall be composed of one part Type II Portland Cement and three parts clean sand.

Maximum allowable deflection (reduction in vertical inside diameter) of the installed pipe shall be five (5) percent. The Contractor shall furnish a properly sized "Go-No-Go" mandrel, deflectometer, or other approved devices, to check the pipe for maximum allowable deflection approved by the City Engineer. Said mandrel or other device shall be provided to the City Engineer for review and approval prior to initiating deflection testing. At any location where the deflection is determined to be excessive, the City Engineer may require the Contractor to remove, re-bed, and if required, replace the pipe. The City Engineer may require certification by the manufacturer that the test results comply with specification requirements. The pipe shall have a home mark to indicate full penetration of the spigot when a joint is made. The date of manufacture shall be marked on the pipe. The pipe being installed shall have been manufactured within twelve (12) months of the date of installation.

4. Other pipe materials including reinforced concrete box culvert and reinforced concrete elliptical pipe that will provide a storm drain system with a minimal leakage rate and maximum durability may be allowed with prior approval by the City Engineer.
5. Warning/marketing tape shall be minimum six (6) inches wide, green plastic (non-detectable) and marked "Caution Storm Drain Below," or approved equal wording. Warning tape shall be placed in all main lines and storm drain lateral trenches on top of the initial backfill zone centered over the pipe.
6. All flexible (non-rigid) pipe shall be delivered and handled by means which will provide adequate support to the pipe and does not subject it to undue stress or damage. When handling and placing pipe, care shall be taken to prevent impact blows, abrasion damage, and gouging or cutting (by metal surface or rocks). The manufacturer's special handling requirements shall be strictly observed. Special

care shall be taken to avoid impact when the pipe is handled at a temperature of forty (40) degrees or less. Pipe shall be stored on a relatively flat surface so that the full length of the pipe is evenly supported. The pipe, fittings, and gaskets shall be covered with an opaque material when outdoors for a period of fifteen (15) days or longer. Any pipe, fittings, or gaskets found to be damaged by weather or handling by the City Inspector shall be removed and replaced by the Contractor at their expense. The City Inspector has the sole authority to make such determination.

7. The use of Non-Reinforced Concrete pipe will be considered on a case-by-case basis with special approval required by the City Engineer.

B. MANHOLES AND JUNCTION BOXES

1. Storm drain manhole bases may be cast-in-place or precast conforming to the Standard Details. Barrel, cone and grade rings shall conform to ASTM C478. Precast barrel sections shall be forty-eight (48) inch diameter unless a larger diameter barrel is shown on the improvement plans or directed by the City Engineer.
2. Frame and Cover (twenty-four (24) inch diameter).

The country of origin shall be clearly and permanently shown on the top surface of the frame and cover in accordance with the Trade and Tariff Act of 1984.

Date of manufacture shall be clearly and permanently indicated on the cover and the top of the frame.

Seating surfaces shall be closely machined to nominal dimensions with tolerances not to exceed +/- one sixty-fourth (1/64) of an inch.

The weight of the frame shall be one hundred forty (140) lbs. plus or minus ten (10) lbs. The weight of the cover shall be one hundred thirty (130) lbs. plus or minus five (5) lbs.

3. The storm drain manhole (Standard Detail #302) shall not be used on storm drain conduit greater than thirty-six (36) inches in diameter. Saddle manholes (Standard Detail #304) shall only be allowed on storm drain conduits greater than thirty-six (36) inches in diameter, provided that no junction exists with any other storm drain conduit at the manhole upsize of pipe diameter or change in direction.
4. All other connection structures for storm drainpipe not described above shall be Storm Drain Junction Boxes per Standard Detail #305 or as otherwise approved by the City Engineer.

C. CATCH BASINS

1. Storm drain catch basins shall be cast-in-place or Jensen Precast base section and curb inlet Model 2448 with access frame and cover being South Bay Foundry No.1934 marked "Storm Drain" or approved equal conforming to the Standard Detail #301 unless otherwise shown on the plans or approved by the City Engineer. Concrete strength shall be a minimum of four thousand (4,000) pounds

per square inch.

- D. HEADWALLS, WINGWALLS, ENDWALLS, AND RAILINGS - All headwalls, wingwalls, and end walls shall be constructed of minimum four thousand (4,000) psi reinforced Portland Cement Concrete constructed in accordance with the plans and Section 51 of the State Standard Specifications.
- E. DRAINAGE PUMP STATIONS - Drainage pump stations shall be allowed on an individual basis with the specific approval of the City Engineer.

13.03 CLEANING, INSPECTION, AND TESTING PRIOR TO FINAL ACCEPTANCE

- A. CLEANING, INSPECTION AND TESTING of all constructed Storm Drainage System Improvements shall be subject to the requirements described in Section 14.03D "Cleaning Inspection and Testing of Sewer Lines."
- B. THERE WILL BE A FINAL VISUAL inspection of the completed system to ensure there is no groundwater intrusion. Should damaged Storm Drainpipe or appurtenances be identified during the installation process through final inspection, said pipe and appurtenance sections shall be replaced at the expense of the Contractor. At the discretion of the City, alternative mitigative measures may be taken to remedy damaged Storm Drainpipe and appurtenances as directed and approved by the City Inspector. In addition, if groundwater intrusion is discovered, corrective work shall be done. The cost for any such work shall be borne by the Contractor.

13.04 MEASUREMENT AND PAYMENT

- A. PIPE - The unit of measure and payment for storm drainpipe complete in place shall be per linear foot measured from center of manhole to center of manhole or catch basin, or from center of manhole to interior wall edge of outlet structure as the case may be. Measurement shall be along the pipe center line parallel to the grade of the storm drain.

Payment shall include the furnishing of all labor, materials, water, tools, and equipment required to construct and complete in an efficient and workmanlike manner the installation of storm drainpipe in accordance with the plans and these specifications. Full compensation for all incidentals arising from this work shall be considered as included in the price paid per linear foot measured and no further compensation shall be allowed.

- B. STRUCTURES, MANHOLES, CATCH BASINS, AND CURB INLETS - The unit of measure for payment shall be per each unit. Payment shall be made at the bid price per item for each structure complete in place and shall include the cost of excavation, backfill, frames, covers, plates, or reinforcing steel where required.

Payment shall include the furnishing of all labor, materials, water, tools, and equipment required to construct and complete in an efficient and workmanlike

manner the installation of storm drainpipe in accordance with the plans and these specifications. Full compensation for all incidentals arising from this work shall be considered as included in the price per each unit and no further compensation shall be allowed.