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# STANDARD SPECIFICATIONS FOR MATERIALS AND INSTALLATION OF STORM DRAINAGE PIPELINES IN THE CITY OF SANTA MARIA, CALIFORNIA

## SECTION 1. GENERAL REQUIREMENTS

The work herein provided for is to be done in accordance with the plans, profiles, cross-sections, and the general conditions and special provisions on file in the Engineering Division office of the Department of Public Works of the City of Santa Maria. These specifications are intended to cover all items necessary for the complete installation and construction of public storm drainage pipeline systems, including manhole structures, drainage inlets, connections and other details and appurtenances thereto. All plans must signed by the City Engineer or the Director of Public Works prior to construction activities. Upon request of the City Engineer, all proposed equipment schedules and material lists shall be submitted and approved prior to installation. Where the term "Standard Specifications" is used herein, it shall mean the Standard Specifications of the State of California, Department of Transportation, most recent edition, unless otherwise noted.

## SECTION 2. MATERIALS REQUIREMENTS

A. STORM DRAIN PIPE

1. General

Storm drain pipe shall be reinforced concrete pipe (RCP) with rubber gasketed joints, polyvinyl chloride pipe (PVC), high-density polyethylene (HDPE) pipe, or other pipe material approved for the specific application by the City Engineer. Unless approved by the City Engineer, the minimum pipe size for storm drain pipelines installed within the public right-of-way shall be 18" diameter. Storm drain pipe used for conveying private drainage underneath a sidewalk to the street gutter shall comply with the Standard Drawings sidewalk drain-channel or sidewalk drain-pipe.

Storm drain pipe shall be free from defects, cracks, spalls, or other damage. Causes for rejection are listed in APWA Standard Specifications Section 207. Joint materials shall be newly manufactured and shall be the correct material for the application. If the City Engineer determines that the pipe or joint materials are inadequate, the materials shall be removed from the project site and replaced with new materials acceptable to the City Engineer.

2. Reinforced Concrete Pipe (RCP)

RCP installed within public or private streets, public easements, and retention basins shall be a minimum of Class III, manufactured in accordance with the requirements of Section 65, Reinforced Concrete Pipe, of the Standard Specifications of the State of California. RCP shall be wet-cast, spun pipe, or machine-made pipe, per APWA Standard Specifications Section 207.

3. Polyvinyl Chloride Pipe (PVC)

PVC shall be SDR 35, Class 160. PVC pipe and fittings shall be manufactured in accordance with the requirements of Section 64, Plastic Pipe, of the Standard Specifications. A manufacturer's Certificate of Compliance shall be provided in conformance with Section 64-1.02, Materials, of the Standard Specifications.

4. High Density Polyethylene Pipe (HDPE)

HDPE pipe installed within public or private streets, public easements, and retention basins shall be corrugated exterior, Type "S" (smooth interior) pipe for storm drain installation as shown on the plans, unless otherwise approved. HDPE pipe and fittings shall be manufactured in accordance with the requirements of Section 64, Plastic Pipe, of the Standard Specifications. A manufacturer's Certificate of Compliance shall be provided in conformance with Section 64-1.02, Materials, of the Standard Specifications. HDPE pipe installations shall comply with special bedding and backfill requirements described herein. HDPE pipe shall not be used with depth of cover less than 2 feet.

The Contractor shall provide a written one-year warranty to guarantee the materials and installation of the HDPE storm drain system.

5. Other Pipe Materials

The City Engineer shall approve use of other pipe materials for installation as storm drainage conveyance facilities.

B. PIPE JOINTS

1. Reinforced Concrete Pipe Joints

Reinforced concrete pipe joints shall be rubber-gasketed joints conforming to Section 208 of the APWA Standard Specifications for Public Works Construction. Joints shall be watertight, conforming to the performance standards of ASTM D3212 certified to withstand a minimum internal pressure of 5 psi, or as otherwise required by the plans and approved by the City Engineer. A joint lubricant approved or supplied by the manufacturer shall be used on the gasket and bell during assembly.

2. Polyvinyl Chloride Pipe Joints

PVC pipe joints shall be installed using specified materials and in accordance with the manufacturer's instructions as approved by the City Engineer. Solvent cement shall be applied to pipe and fitting per ASTM D2855.

3. High Density Polyethylene Pipe Joints

HDPE pipe joints shall conform to standard joint requirements in Section 61-1.02, Performance Requirements for Culvert and Drainage Pipe Joints, of the Standard Specifications.

HDPE pipe joints shall be bell and spigot joints with elastomeric o-ring gaskets conforming to ASTM F477. Joints shall be manufactured integrally with the pipe material. Joints shall be watertight, conforming to the performance standards of ASTM D3212 certified to withstand a minimum internal pressure of 5-psi, or as otherwise required by the plans and approved by the City Engineer. Split couplers are not acceptable. A joint lubricant approved or supplied by the manufacturer shall be used on the gasket and bell during assembly.

Joints shall not be pulled or deflected unless approved by the City Engineer. Horizontal and vertical angle points, shown on the plans, shall be accomplished through the use of fabricated bends supplied by the pipe manufacturer.

4. Other Pipe Joints

Joints for other pipe materials shall be made in compliance with the recommendations of the pipe and joint manufacturers and approved for the specific application by the City Engineer.

C. MANHOLE MATERIALS INCLUDING FRAMES AND COVERS

1. General

All manholes shall be constructed of Portland Cement Concrete, and shall be a minimum of 48" in diameter. Larger diameter manholes may be used to accommodate large pipe sizes. All manhole frames and covers shall conform to APWA Standard Plan 630-2, or approved equal. Eccentric cones shall be installed unless otherwise noted.

2. PreCast Manholes

Precast concrete manhole pipe shall conform to ASTM C-478. Precast concrete manhole materials shall be in accordance with City of Santa Maria Standard Drawing Standard Manhole & Details, with the exception that the manhole cover shall be marked "D". The use of precast manhole bases shall require the approval of the City Engineer. Precast flattop manholes shall be approved if project specific conditions warrant.

3. Cast-in-Place Manholes

Cast-in-place manholes shall conform to Los Angeles County Flood Control District Drawing No. 2-D102 Manhole No. 1

4. Pressure Manholes

Pressure manholes shall be constructed per County of Los Angeles Standard Plan 3036-0, or APWA 328-1 and 329-1.

5. High Density Polyethylene

Premolded HDPE manholes and structures shall not be used.

D. DRAINAGE INLETS

1. General

Concrete for storm drainage inlets shall conform to City of Santa Maria Standard Specification S-109.

2. Drop Inlet Structures

Drop Inlets shall be per City of Santa Maria Standard Drawing and per the approved plans. The apron shall be angled from the lip of gutter for a distance of 2 feet.

3. Other Inlet Structures

Other inlet structures may be approved for use in public right-of-way upon approval of the City Engineer.

## SECTION 3. CONSTRUCTION METHODS

A. LAYOUT

1. Setting Stakes

The Contractor shall be responsible for the establishment of the lines and grades for the work as shown on the plans. Contractor shall employ licensed surveyors or engineers to set line and grade stakes. The Contractor shall preserve all stakes set for the lines, grades or measurements of the work in their proper places until authorized to remove them by the City Engineer. Any expense incurred in replacing said stakes which the Contractor or his subordinates may have failed to preserve, shall be borne by the Contractor.

2. Preservation of Monuments

The Contractor shall not disturb any monuments or stakes found on the line of the improvement without permission from the City Engineer and shall bear the expense of resetting any monuments or stakes which have been disturbed by its forces.

B. TRENCHING

1. Trench Methods

Excavation for laying pipes shall be made in open cut. All trenches shall have vertical sides from pavement or street surface to bottom of trench, conforming to OSHA requirements. Where there is no pavement surface, or where soil conditions dictate (flowing sands, groundwater, etc.), trenches may be sloped from the top of the trench to a line six inches (6") above the top of the pipe upon approval of City Engineer.

That portion of the trench from the bottom to the top of the pipe shall not exceed the exterior diameter of the pipe more than eight inches (8") on each side or a total of sixteen inches (16") greater than the overall diameter of the pipe, exclusive of bells.

Trenching shall conform to the provisions of Section 19 of the Standard Specifications and City Standard Drawing for trench repair.

The bottom of the trench shall be prepared by hand tools to fully and uniformly support the bottom quadrant of the pipe.

Trench bottoms shall be prepared immediately preceding the installation of the pipe. Bell, or joint, holes shall be carefully excavated at proper intervals so that the bells or joints support no part of the load.

Any excavation in excess of that required to support the bottom quadrant of the pipe shall be replaced and machine tamped to form a supporting surface equal to the undisturbed trench bottom.

C. PIPE LAYING

1. Storm Drain Pipe

Storm drain pipe shall be laid to the lines and grades as shown on the plans. A straight line and grade shall run from manhole to manhole (i.e. no break in line or grade between manholes), unless approved by the City Engineer.

Pipe shall not be placed in water or when the trench or weather is unsuitable for such work.

The pipe shall be installed without grade breaks upgrade with the bell end upstream, unless otherwise authorized, and shall be adjusted to grade by cutting or scraping a trough in the bottom of the trench to conform to the bottom quadrant of the pipe.

All pipes will be laid to grade and line according to stakes set at regular intervals to establish grade by a licensed surveyor or engineer. Pipe grades and alignment shall be established in the trench by conventional survey techniques, or by use of a laser. A laser or string line shall be established in the trench along the centerline of the proposed pipeline, said line being used to determine the horizontal and vertical location of each joint of pipe.

Final pipe placement shall vary in line or grade no more than one-eighth inch (1/8") in ten feet (10') on either side of the centerline or grade line established by the surveyor.

The pipe shall be carefully cleaned, particular attention being paid to spigot and bell ends before joining. The spigot end of the pipe shall be brought into contact with the shoulder in bell and the pieces shall be matched so as to provide an even flow line along the inside lower half of the pipe.

Whenever the work of laying pipe is discontinued for any reason, the end of the pipe shall be securely closed with a tight-fitting plug. The pipe shall be left clean upon completion.

Pipe laying shall conform to the provisions of Section 64 and Section 65 of the Standard Specifications.

2. Other Pipes

If other than RCP, PVC, or HDPE is specified and/or approved, it shall be laid in compliance with the instructions of the pipe manufacturer and approved by the City Engineer.

D. PIPE BEDDING

1. General

Bedding shall consist of the bedding foundation and the bedding backfill.

Bedding foundation shall be carefully and accurately shaped and rounded to conform to the lower quarter of the pipe. The bedding foundation shall provide a uniform density throughout the entire length of the pipe. Where it becomes necessary to remove boulders, unsuitable materials, or other interfering objects at subgrade for bedding, any void below such subgrade shall be filled with the bedding foundation material designated on the plans and in these specifications.

The bedding backfill shall be defined as that material supporting and surrounding the pipe, and extending to 12" above the top of the pipe. Where concrete is specified to cover the pipe, the top of the concrete shall be considered as the top of the bedding.

2. Reinforced Concrete Pipe

Bedding foundation for reinforced concrete pipe installations shall be shaped bedding, and shall conform to the requirements of Section 19,

Earthwork, of the Standard Specifications. Bedding backfill shall have a sand equivalent of 20 minimum, and shall conform to the following gradation:

| | |
|---|---|
| 100% | passing 2" |
| 35% - 100% | passing No. 4 |

The bedding backfill material shall be placed and compacted to 90% minimum relative density equally on both sides of the pipe.

3. Polyvinyl Chloride Pipe

Bedding foundation for polyvinyl chloride pipe installations shall be a 4-inch minimum sand bedding, conforming to the requirements of Section 19, Earthwork, of the Standard Specifications. Bedding backfill shall be identical to that specified for RCP above.

4. High Density Polyethylene Pipe

Bedding foundation for HDPE pipe shall be sand bedding conforming to the requirements of Section 19, Earthwork, of the Standard Specifications. Bedding backfill for HDPE pipe installations shall be crushed rock, class II aggregate base, or 2-sack concrete slurry. If concrete slurry backfill is used, the contractor shall take appropriate steps to prevent pipe movement and floating of the pipe. If crushed rock is used, the entire perimeter of the pipe zone bedding shall be lined with approved filter fabric. Native materials will not be used for bedding backfill in HDPE installations.

A continuous strip of high visibility locator tape shall be installed along the top of the pipe bedding between the manholes or other structures.

Crushed rock used for bedding backfill for HDPE pipe shall not exceed 1/2-inch in size.

Once the HDPE pipe has been placed in the trench, and joints have been completed, the pipe shall be carefully bedded and grade shall be made and set. The contractor shall take measures to secure the pipe in the trench prior to installation of the bedding backfill material. Bedding backfill material shall then be installed carefully to its limit, 12-inches above the top of pipe. The crushed rock or class II aggregate base shall be placed in the trench in 18" lifts, and each lift shall be consolidated into place with one pass of a vibratory compactor.

E. TRENCH BACKFILL

1. General

Trench backfill shall be defined as that material extending from the top of bedding backfill to subgrade. All trench backfill shall conform to the requirements of structural backfill as indicated in Section 19 of the Standard Specifications.

The trench shall be backfilled in compliance with Standard Drawing for trench repair.

2. Reinforced Concrete Pipe and PVC Pipe

Trench backfill in existing streets where cover is less than 2 feet shall be 2-sack cement slurry. In new streets, trench backfill shall be structural backfill compacted to 95%, a sand equivalent of 20, and no rocks or deleterious material in excess of 3-inches.

3. High Density Polyethylene Pipe

HDPE pipe shall not be installed in public right of way where cover is equal to or less than 2.0 feet. If cover is less than 3.0 feet, trench backfill shall be 2 sack concrete slurry. If cover is greater than 3.0 feet, trench backfill shall be structural backfill compacted to 95%, a sand equivalent of 20, and no rocks or deleterious material in excess of 3-inches.

F. TESTING

1. Reinforced Concrete Pipe

For pressure pipeline sections, the rubber-gasketed joints used with reinforced concrete pipe shall be air pressure tested per APWA Standard Specifications for Public Works Construction Section 306-1.4.4 to an air pressure 150% of the design pressure.

2. High Density Polyethylene Pipe

The HDPE storm drain pipe installations within City streets shall be mandrel tested to ensure that the pipe has maintained a circular shape in cross section throughout installation. The pipe shall remain within 5% of a true circular shape. Pipe deflection beyond 5% shall be repaired by reinstallation.

The City Engineer, based upon site conditions may require full time inspection or additional testing. If required, HDPE storm drain installations within City streets shall be tested to insure watertightness and freedom from infiltration or ex-filtration. The pipe shall be tested by the air pressure test procedure identified in Section 306-1.4.4 of the APWA Standard Specifications for Public Works Construction, modified to test for 5-psi pressure (low pressure test for sewers) and summarized as follows:

a. Plug all pipe outlets with suitable test plugs bracing each plug securely.

b. Add air slowly to the portion of the pipe installation under test until the internal pressure is raised to 5.0-psig.

c. Check exposed pipe and plugs for abnormal leakage by coating with a soap solution. If any leakage is observed, bleed off air and make necessary repairs.

d. After an internal pressure of 5.0-psig is obtained, allow at least two minutes for air temperature to stabilize, adding only the amount of air required to maintain pressure.

e. After the two-minute period, disconnect air supply.

f. When pressure decreases to 3.5-psig, start the stopwatch. Determine the time in seconds required for the internal air pressure to reach 2.5-psig. This time interval shall not be less than that computed under Table 306-1.4.4(A) Low Pressure Test for Sewers.

If a leak is determined to exist, the Contractor shall locate it by a means of his own choosing and make necessary repairs, after which the test will be repeated until found to be satisfactory. The Contractor will furnish the equipment necessary for the performance of this test, with the exception of the gauges, which will be furnished by the City Engineer. The air test equipment shall be maintained on the job site at all times.

G. MANHOLES, INCLUDING FRAMES AND COVERS

1. General

Manholes and appurtenances thereto shall be of the type shown on plans and constructed complete in every detail. Projecting ends of pipe shall be adequately supported to prevent displacement from line-to-grade during construction of the base.

When shown on the drawings, the Contractor shall furnish and install branch pipe(s) projecting clear of the manhole wall. These stub ends shall be plugged with metal or wooden discs of the proper size and cemented in place.

The Contractor shall finish the bottom of the manhole to create an open concave channel to the required cross-section, unless otherwise noted on the plans. Every precaution shall be taken by the Contractor to insure a watertight construction of all manholes.

The Contractor shall furnish and install all manhole frames and covers in compliance with APWA Standard Plans as indicated above.

The tops of the covers shall be set flush with the finish grade as shown on the construction drawings.

Bearing surfaces of the covers and bearing surfaces of the frames shall be smooth and even so as to prevent rocking or clattering by passing vehicles.

2. Reinforced Concrete

Precast concrete manhole pipe shall be constructed in compliance with APWA Standard Plans as indicated above.

The City Engineer shall approve the use of cast-in-place manholes.