

SECTION 33 40 00
STORM DRAINAGE UTILITIES

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies construction of outside, underground storm sewer systems. The storm sewer systems shall be complete and ready for operation, including all drainage structures, frames, grate and covers and connections.

1.2 RELATED WORK:

- A. Maintenance of Existing Utilities: Section 01 00 00, GENERAL REQUIREMENTS.
- B. Excavation, Trench Widths, Pipe Bedding, Backfill, Shoring, Sheeting, Bracing: Section 31 20 11, EARTH MOVING (short form).
- C. Concrete Work, Reinforcing, Placement and Finishing: Section 03 30 00, CAST-IN-PLACE CONCRETE.

1.3 QUALITY ASSURANCE:

- A. Products Criteria:
 - 1. Multiple Units: When two or more units of the same type or class of materials or equipment are required, these units shall be products of one manufacturer.
 - 2. Nameplates: Nameplate bearing manufacturer's name, or identifiable trademark, securely affixed in a conspicuous place on equipment, or name or trademark cast integrally with equipment, stamped, or otherwise permanently marked on each item of equipment.
- B. Comply with the City of Tucson/Pima County (COT/PC) standard specification and details for public improvements, and the following specifications.

1.4 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturers' Literature and Data: Submit the following as one package:
 - 1. Piping.
 - 2. Jointing material.

1.5 APPLICABLE PUBLICATIONS:

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - A48-03/A48M-03.....Gray Iron Castings

A536-84(2004).....Ductile Iron Castings
A615-05/A615M-05.....Deformed and Plain-Billet Steel Bars for
Concrete Reinforcement
C150-04ae1.....Portland Cement
C443-05/C443M-05.....Joints for Concrete Pipe and Manholes, Using
Rubber Gaskets
C478-03a/C478M-03a.....Precast Reinforced Concrete Manhole Sections
C857-95(2001).....Minimum Structural Design Loading for
Underground Precast Concrete Utility Structures
C923-02/C923M-02.....Resilient Connectors between Reinforced Concrete
Manhole Structures, Pipes and Materials
D698-00ae1.....Laboratory Compaction Characteristics of Soil
Using Standard Effort (12,400 ft-lbf/ft³ (600
kN-m/m³))
D2412-02.....Determination of External Loading
Characteristics of Plastic Pipe by Parallel
Plate Loading
D2321-04e1.....Underground Installation of Thermoplastic Pipe
for Sewers and Other Gravity Flow Applications.
D3034-04a.....Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe
and Fittings
D3212-96a(2003)e1.....Joints for Drain and Sewer Plastic Pipes Using
Flexible Elastomeric Seals
D3350-04.....Polyethylene Plastics Pipe and Fittings
Materials
D4101-05a.....Polypropylene Injection and Extrusion Materials
F477-02e1.....Elastomeric Seals (Gaskets) for Joining Plastic
Pipe
F679-03.....Poly (Vinyl Chloride) (PVC) Large-Diameter
Plastic Gravity Sewer Pipe and Fittings
F714-05.....Polyethylene (PE) Plastic Pipe (SDR-PR) Based on
Outside Diameter
F794-03.....Poly (Vinyl Chloride)(PVC) Profile Gravity Sewer
Pipe and Fittings Based on Controlled Inside
Diameter
F894-98a.....Polyethylene (PE) Large Diameter Profile Wall
Sewer and Drain Pipe
F949-03.....Poly (Vinyl Chloride) (PVC) Corrugated Sewer
Pipe with Smooth Interior

F1417-92(2005).....Installation Acceptance of Plastic Gravity Sewer
Lines Using Low-Pressure Air

NOTE: ASTM test methods shall be the current version as of the date of
advertisement of the project.

PART 2 - PRODUCTS

2.1 GENERAL

All materials shall conform to the City of Tucson/Pima County (COT/PC)
standard specifications for public improvements.

2.2 INLETS AND CATCH BASINS:

A. Inlets and catch basins shall be constructed of precast concrete or
cast-in-place concrete. Inlets and catch basins shall be in accordance
with COT/PC standard details, and the following VA requirements, in case
of variance, VA requirements supersede:

1. Precast Catch Basins: Concrete for precast sections shall have a
minimum compressive strength of 35 MPa (5,000 psi) at 28 days, ASTM
A615, Grade 60 reinforcing steel, rated for AASHTO HS20-44 loading
with 30 percent impact, and conform to ASTM C-857.
2. Flexible sealing compound shall be packaged in extruded preformed
shape, sized to completely fill the joint between precast sections,
and form permanently flexible watertight seal. The sealing compound
shall be non-shrink and meet AASHTO M-198B.
3. Frames and covers shall be gray cast iron conforming to ASTM A48. The
frame and cover shall be rated for HS20-44 loading, have a studded
pattern on the cover, and the words "storm sewer". The studs and the
lettering shall be raised 8 mm (5/16 inch). The cover shall be a
minimum of 600 mm (24 inches) in diameter and shall have four 19 mm
(3/4 inch) vent holes and two lifting slots. The bearing surface of
the frame and cover shall be machine finished. The cover shall fit
firmly on the frame without movement when subject to traffic.

B. Frame and Cover and Gratings: Frame and cover for gratings shall be in
accordance with COT/PC standard details. Shape, size, and waterway
openings for grates shall be as indicated on the drawings.

2.3 CONCRETE:

Concrete shall be in accordance with COT/PC standard specification 106.
For concrete not specified in above standards, concrete shall have a
minimum compressive strength of 20 MPa (3000 psi) at 28 days. The
cement shall be Type III conforming to ASTM C150.

2.4 REINFORCING STEEL:

Reinforcing steel shall be deformed bars, ASTM A615, Grade 40 unless
otherwise noted.

PART 3 - EXECUTION

3.1 STORM DRAINS AND DRAINAGE STRUCTURES:

Installation and testing of the storm drain system shall comply with the COT/PC standard specifications and details for public improvements and the following specifications.

3.2 REGRADING:

- A. Raise or lower existing manholes and structures frames and covers in regraded areas to finish grade. Carefully remove, clean and salvage cast iron frames and covers. Adjust the elevation of the top of the manhole or structure as detailed on the drawings. Reset cast iron frame and cover, grouting below and around the frame. Install concrete collar around reset frame and cover as specified for new construction.
- B. During periods when work is progressing on adjusting manholes or structures cover elevations, the Contractor shall install a temporary cover above the bench of the structure or manhole. The temporary cover shall be installed above the high flow elevation within the structure, and shall prevent debris from entering the flow stream.
- C. The Contractor shall comply with all OSHA confined space requirements when working within existing structures.

3.3 INLETS AND CATCH BASINS:

A. General:

1. Rectangular Structures:

- a. Reinforced concrete structures shall be installed in accordance with COT/PC specifications and details.
 - b. Precast concrete structures shall be placed on a 200 mm (8 inch) reinforced concrete pad, or be provided with a precast concrete base section. Structures provided with a base section shall be set on a 200 mm (8 inches) thick aggregate base course compacted to a minimum of 95 percent of the maximum density as determined by ASTM D 698. Set precast section true and plumb. Seal all joints with preform flexible gasket material.
2. Do not build structures when air temperature is 0 degrees C (32 degrees F), or below.
3. Invert channels shall be smooth and semicircular in shape conforming to inside of adjacent sewer section. Make changes in direction of flow with a smooth curve of as large a radius as size of structure will permit. Make changes in size and grade of channels gradually and evenly. Construct invert channels by one of the listed methods:
- a. Forming directly in concrete base of structure.
 - b. Building up with brick and mortar.

4. Floor of structure outside the channels shall be smooth and slope toward channels not less than 1:12 (25mm per 300mm, 1-inch per foot) nor more than 1:6 (50mm per 300mm, 2 inches per foot). Bottom slab and benches shall be concrete.

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