

**SECTION 02562**  
**SANITARY SEWER MANHOLES**

**02562.01 GENERAL**

**A. Description**

Sanitary sewer manhole installation shall include, but not necessarily be limited to, furnishing and installing sanitary sewer manholes and miscellaneous structures of concrete built to the shapes and dimensions shown and in accordance with the Contract Documents.

**B. Related Work Included Elsewhere**

1. Trench excavation, backfill, and compaction; Section 02250.
2. Sanitary sewers; Section 02561.
3. Cast-in-place concrete; Section 03300.
4. Precast concrete utility structure installation; Section 03400.
5. Grout; Section 03600.
6. Mortar; Section 04100
7. Brickwork, unit masonry; Section 04200.

**C. Quality Assurance**

1. Materials

The Engineer will inspect all materials before and after installation to ensure compliance with the Contract Drawings.

2. Field Tests

- a. Manholes and other structures will be air vacuum tested for watertightness. Testing is customarily done before backfilling but may be done after backfilling at contractor's own risk. Visual inspection after backfilling is also required.
- b. Manholes and other structures may be visually inspected by the Engineer for leakage. Any visible leak shall be sealed or resealed until all leakage into the unit is satisfactorily eliminated. Infiltration testing shall be conducted only when the sewers attached to the manholes or other structures are tested in that manner. Testing shall be in accordance with Section 02561.

- c. Manholes to be vacuum tested shall have 10-inches of mercury applied to the manhole and the time measured for the vacuum to drop from 10-inches to 9-inches of mercury. Vacuum equipment shall be approved by the Engineer prior to its use. Following are minimum allowable test times for manhole acceptance at the specified vacuum drop.

Depth of Manhole(feet)	Time (sec)		
	Manhole Diameter (inches)		
	<u>48"</u>	<u>60"</u>	<u>72"</u>
8	14	18	23
10	17	23	28
12	21	28	34
14	25	32	40
16	28	37	45
18	32	41	51
20	35	46	57
22	39	51	62
24	42	55	68
26	46	60	74
28	49	64	80
30	53	69	85

Test times for structures other than manholes will be based on the times for manholes of the nearest equivalent volume or as directed by the Engineer.

**D. Submittals**

1. Shop Drawings

Shop drawings shall be submitted as specified in the "General Provisions" for the following materials, and shall include the following information:

- a. Manhole-to-pipeline connectors: product description, materials identification, and installation instructions including torque requirements where applicable.
- b. Flexible plastic gaskets: product description; handling, storage, installation and use information.

2. Certificates of Compliance

Certificates of compliance shall be submitted as specified in the "General Provisions" for the following:

- a. Banded-boot and compression type manhole-to-pipe connectors: stating they meet test requirements of ASTM C 923.

- b. Flexible plastic gaskets installed beneath manhole frames: stating the gasket meets test requirements of AASHTO M 198.

## 02562.02 MATERIALS

### A. Materials Furnished by the County

The County will not furnish any materials for sanitary sewer manholes.

### B. Contractor's Options

1. The Contractor may furnish aluminum or plastic-coated steel for manhole steps.
2. The Contractor may furnish precast or cast-in-place for miscellaneous sanitary sewer structures, unless otherwise noted.
3. The Contractor may furnish mechanically wedged-in-place, cast-in-place banded-boot, or cast-in-place compression type connectors for manhole-to-pipeline connections, where slope of the pipeline is 10% or less.

### C. Detailed Material Requirements

1. Granular bedding beneath manhole bases shall meet the gradation requirements of AASHTO M43, size number 57, as specified in Section 02621.02.
2. Portland cement concrete for cast-in-place structures shall be as specified in Section 03310.02, Mix Number as indicated on the Standard Details or the Plans.
3. Precast manhole bases, risers, cone sections, grade rings, and precast utility structures shall be as specified in Section 03400.
4. Joints shall be "0" ring compression type meeting the requirements of ASTM C-443.
5. Manhole Lining: All new and existing manholes receiving flows from sewage force mains or low pressure sewers shall be lined.
  - a. New concrete manholes shall be thermoplastic sheets of polyvinyl chloride (PVC) meeting the requirements of ASTM D1784, high density polyethylene (HDPE) meeting the requirements of ASTM D1248, or polypropylene (PP) meeting the requirements of ASTM D4101, 16344C. Thermoplastic sheets shall incorporate an anchoring system which permits the sheets to be placed in concrete forms and cast integrally with the concrete of the structure.
  - b. Existing manholes shall be lined using Sewpercoat cementitious liner (100% calcium aluminate) according to Section 02565. The connecting manhole plus at least two additional downstream manholes are to be lined.

6. Quick-setting non-shrink grout shall be as specified in Section 03600.
7. Mortar for brickwork and grade rings shall be as specified in Section 04100.
8. Bonding agent shall be as specified in Section 04100.
9. Brick for manhole inverts and miscellaneous structures shall be sewer brick as specified in Section 04200.
10. Curing compound shall meet the requirements of ASTM C 309, Type 2, white pigmented as manufactured by W.R. Meadows, White Pigment No. 1645; Richmond Screw Anchor Co., Rich Cure White E; or equal.
11. Frames, covers, and steps shall be as specified in Section 05500. Covers shall be labeled in accordance with the Standard Details. Frames and covers shall be factory coated with a coal tar paint meeting the requirements of Federal Military Specification MIL-C-18480B. Steps shall be as dimensioned in the Standard Details.
12. Dampproofing for exterior of manholes and waterproofing for miscellaneous structures shall be as specified in Section 07100.
13. Manhole-to-Pipeline Connectors
  - a. Water-stop type connectors shall be only used when slope of the connecting pipeline is greater than 10%. Water-stop type connections shall be the Type CMA Adapter as manufactured by Fernco, Inc.; or equal.
  - b. Mechanically wedge-in-place type connectors shall be Link-Seal as manufactured by the Thunderline Corp; Z-Lok XP as manufactured by A-Lok Products, Inc.; Kor-n-Seal as manufactured by National Pollution Control Systems, Inc.; or equal.
  - c. Cast-in-place type connectors shall be:
    - 1) Banded-boot type: Z-Lok as manufactured by A-Lok Products, Inc. or equal.
    - 2) Compression type: A-Lok as manufactured by A-Lok Products, Inc.; the Dual Seal II as manufactured by Dual Seal Gaskets, Inc.; or equal.
14. Flexible plastic gaskets between the manhole or grade rings and the manhole frame shall be extruded rope, type B, 3/4 inch minimum diameter, butyl based, meeting requirements of AASHTO M 198 as manufactured by Concrete Sealants Inc., CS-102 or CS-202; A-Lok Products, Inc., Butyl-Lok Hamilton Kent Mfg. Co., Kent Seal; or equal.

15. Grade rings – HDPE grade rings for 24-inch manhole, as manufactured by Ladteck. Sizes are ¼ to four inch; also a slope ring from ¾ to one and a half inches. Plastic grade rings are not to be used in unpaved rights-of-way. For unpaved rights-of-way, precast concrete grade rings are to be used.
16. Fiberglass witness post – for manholes in cross country rights of way/easements. Fiberglass posts to extend 5 feet above the top of manhole; posts to be reflective and identified as Sewer (green posts with black lettering). Marker to be placed on upstream side of manhole, facing forward up the right of way, embedded two feet into the ground.
17. Bentonite shall be in granular form as specified in Section 07130.02 for waterproofing at pipe penetrations.

### 02562.03 EXECUTION

#### A. General

1. Excavation, foundation preparation, backfill, and compaction shall be as specified in Section 02250.
2. Manholes and drop connections shall be installed in accordance with the Standard Details and as specified herein.
3. Miscellaneous structures shall be constructed where shown and as indicated on the Plans or as directed by the Engineer.
  - a. Cast-in-place concrete construction shall be as specified in Section 03300.
  - b. Brick construction shall be as specified in Section 04200.
4. Reinforced concrete, and ductile iron pipelines connected to manholes and other structures shall have a pipe joint not more than 2 feet from the exterior wall of the structure.

#### B. Manhole Installation

1. Manholes shall be installed and frames and covers set as pipeline installation progresses. The manhole vertical axis shall be plumb and directly over the centerline of the pipeline unless otherwise shown or directed.
2. Manholes shall be watertight. Exteriors shall be coated with dampproofing in accordance with Section 07100 and in accordance with the manufacturer's recommendations.
3. Channels for receiving and passing water shall be formed in the bottom of manholes as shown or directed. All such channels shall be lined with brick, brick and split

vitrified pipe, or precast concrete channels as manufactured by Atlantic Concrete Products, Inc. Channels shall slope smoothly and evenly and a channel bench constructed to the height of the crown of the highest pipe. Channels and a 2-foot length of pipe with a watertight plug shall be installed in the manhole for future extensions where shown on the Plans or directed by the Engineer. For manholes constructed with thermoplastic liners, liner sheets or panels shall be field cut and shaped to fit the floor and channels of the manhole. Concrete for the floor and channels shall be poured through openings cut in the thermoplastic liner so that the liner anchors are cast integrally with the floor and channel concrete.

4. Pipes shall be cut flush with the inside wall of the manhole. Exterior of pipe penetration shall be waterproofed in accordance with 07130. For manholes constructed with thermoplastic liners, the liner sheets or panels shall have their seams welded in accordance with the plastic manufacturer's instructions only after all concrete has thoroughly dried. Seams around pipe penetrations shall be sealed with a caulk type sealant compatible with the liner material as recommended by the liner manufacturer. Openings in the floor liner used for pouring the concrete floor and channel shall be patched and welded in accordance with the liner manufacturer's instructions.
5. The frame and cover shall be installed in accordance with the Standard Details.
  - a. Obtain proper grade by using a minimum of one 2, 3, 4 or 6 inch thick grade ring and a maximum combination of rings not to exceed a total of 12". The grade rings shall be set in full beds of mortar not less than 1/4 nor more than 1 1/4-inches thick. Anchor boltholes shall be packed tight with mortar, with the mortar in the holes of the top ring finished flush with the ring surface. All horizontal, circumferential, and vertical mortar joints inside and outside of the structure shall be pointed for their full width. Depth of pointing shall not exceed 3/8 inch. Mortar mix shall include a bonding agent in accordance with Section 04100 of these specifications. The limit of application of mortar mix shall be consistent with manufacturer's recommendations.

Manholes shall have frame anchored to manhole with anchor bolts in accordance with the Standard Details.

- b. The newly installed grade ring transition section shall be completely coated on the inside, top, and outside with curing compounds, overlapping a minimum of 6 inches down on the manhole structure. The curing compound shall be applied within 3 hours after the mortar placement. Transition by parging overhang joint between ring and manhole structure, inside and outside of manholes, and apply curing compound. Cure entire grade ring transition section for a minimum of 24 hours prior to setting manhole frame and cover and backfilling.
  - c. Place two rings of flexible gasket on the precast concrete adjustment ring below the manhole frame so one ring will be under and near the inside and

the other under and near the outside of the frame flange. There shall be a minimum overlap of 2-inches of the ends of the flexible gaskets.

- d. Install frame and cover set flush with existing surfaces or to new elevations shown on the Plans or as directed by the Engineer in accordance with Standard Details. If required for an existing manhole, drill manhole wall and provide anchor bolts as required, except in paved areas where anchor bolts shall not be used. Where anchor bolts are not required, concrete shall be placed below the roadway base course to anchor the manhole frame and cover in accordance with Standard Details.
- e. Watertight manhole frames and covers shall be used in all non-paved utility rights of ways, easements, and where indicated on the plans.

In non-paved areas the top of the pre-cast manhole shall extend twelve inches above proposed grade or the 100-year flood plain elevation, which ever is higher. The frame and cover shall be painted with two coats of lead free industrial enamel paint, color to be safety yellow as manufactured by Sherwin-Williams or equal.

6. Manholes in cross-country rights of ways/easements shall be marked with fiberglass witness posts.
7. Abandonment of existing manholes shall be in accordance with Chapter 7 of the Design Manual and the County Standard Details.

#### **02562.04 METHOD OF MEASUREMENT**

##### **A. Sanitary Sewer Manholes**

Measurement for furnishing and installing sanitary sewer manholes will be made of the number of each type constructed to a standard minimum depth as shown on the Standard Details, plus an additional measurement in linear feet of extra vertical depth of any unit in excess of the standard minimum depth. Measurement will be made from the lowest point in the manhole invert to the highest external point on the top of the manhole frame and cover.

##### **B. Drop Connections**

Measurement for drop connections will be made for the number and type constructed. The manhole on which the drop structure is constructed will be measured and paid for separately as described above.

##### **C. Miscellaneous Structures**

Measurement for miscellaneous structures will be made for the number of each type of unit constructed in accordance with the Plans or as directed.

**02562.05 BASIS OF PAYMENT****A. General**

1. Payments will be made at the unit and/or lump sum prices bid. The prices bid shall include furnishing all labor, tools, equipment, and materials necessary to satisfactorily complete the work as shown, specified, and in strict accordance with the Contract Documents, and accepted by the Engineer.
2. The price(s) bid for furnishing and installing sanitary sewer manholes shall include the following:
  - a. Excavation and backfill as specified in Section 02250.
  - b. Furnishing and installing granular bedding for manhole foundation as shown on the Standard Details and as required elsewhere in the Contract Documents.
3. Payment will be made for contingent items when ordered by the Engineer. Payment will be as specified in Sections 02951, 02952, 02953, 02954, 02955, 02956, and 02957.

**B. Sanitary Sewer Manholes**

Payment for sanitary sewer manholes will be made per each type and size of manhole installed. An additional payment will be made for vertical depth, in excess of the standard minimum depth, per linear foot for each type and size of sanitary sewer manhole. The price(s) bid shall include furnishing and installing all masonry, precast or cast-in-place concrete units including all items as shown on the standard details; and all items necessary to satisfactorily complete the work as specified.

**C. Manhole Drop Connections**

Payment for drop connections will be made per type and size constructed as shown, specified, and directed. The price(s) bid shall include furnishing all pipe, fittings, concrete encasement and all items of work necessary to satisfactorily complete the work.

**D. Miscellaneous Structures**

Payment for miscellaneous structures will be made for each structure constructed to limits shown on the Contract Documents and shall be full compensation for furnishing all items necessary to satisfactorily complete the work.

**E. Dampproofing**

No separate payment will be made for dampproofing, but will be considered incidental to unit prices bid.