

SECTION 02570

MANHOLE CONSTRUCTION

PART 1 – GENERAL

1.1 Description

A. Description of the Work

The work to be performed in accordance with this section includes precast or cast in place concrete manhole construction for sewer and storm drain collection systems.

The work shall include the furnishing of all labor, tools, equipment, materials and performing all required operations to provide a complete item in accordance with the project plans and these specifications.

B. Related Work Specified Elsewhere

Trench Excavation and Backfill.....Section 02300
Sewer Line Construction.....Section 02560
Storm Drain Construction.....Section 02500

1.2 Quality Assurance

A. Reference Test Standards and Specifications

ASTM A48, Specifications for Grey Iron Castings

ASTM C478, Specification for Precast Reinforced Concrete Manhole Sections

ASTM C1107, Specification for Packaged Dry, Hydraulic-Cement Grout, Nonshrink

ASTM D4101, Specification for Propylene Plastic Injection and Extrusion Materials

AWWA C210, Standard for Liquid Epoxy Coating Systems for the Interior and Exterior of Steel Water Pipelines

B. Leakage Test

Test all manholes installed under this contract using the vacuum method described below. Provide all equipment necessary to perform the test. Coordinate test schedule with the **OWNER**. Test will not be accepted unless witnessed by the **OWNER**.

1. Test each manhole immediately after assembly and prior to backfilling.
2. Plug all lift holes with an approved non-shrink grout.
3. Plug all pipes entering the manhole, taking care to securely brace the plug from being drawn into the manhole.
4. Place the test head inside of the top of the cone section and inflate seal in accordance with the manufacturers recommendations.
5. Draw a vacuum of 10 inches of mercury and shut off the vacuum pump. With the valves closed, measure the time for the vacuum to drop to 9 inches. The manhole shall pass if the time for the vacuum to drop is greater than 75 seconds for 60" diameter manhole and 90 seconds for 72" diameter manholes.
6. If the manhole fails the initial test, make necessary repairs with a non-shrink grout while the vacuum is still being drawn. Retest until a satisfactory test is obtained.

1.3 Submittals

A. Certificates of Compliance and Descriptions

1. Frame and Cover
2. Manhole Sections
3. Precast Base

1.4 Product Delivery, Storage and Handling

Take all necessary precautions in handling, storage and placement of manhole components and appurtenances. Replace defective materials.

PART 2 – MATERIALS

2.1 Manhole Bases

A. Waterstops

Neoprene or rubber, resistant to sewage environment as recommended by the manufacturer. Place water stop around all pipes penetrating the manhole base. Place the waterstop in the middle of the manhole wall per the manufacturer's recommendation. Place non-shrink grout on each side of the water stop, if required, to thoroughly seal and protect the joint.

B. Precast Concrete Base

ASTM C478, Type V cement, minimum 28 day compressive strength 4,000 psi, minimum 6 inches of concrete between invert and exterior of the base, reinforced as required. Base shall be coated with polymorphic polymer coating.

C. Cast In Place Concrete Base

Specification Section 3300, Class A, Concrete.

2.2 Precast Concrete Manhole Barrel Sections

ASTM C478, Type V cement, 60 inch inside diameter. Eccentric cones with the same wall thickness and reinforcement, sized for 24 inch frame and covers.

2.3 Flat Slab Tops

ASTM C478, Type V cement, HS20 design loading, sized for 24 inch frame and cover.

2.4 Manhole Extension

ASTM C478, 24 inch inside diameter of similar quality as manhole sections.

2.5 Manhole and Base Coatings

PPC coating as manufactured by Polymorphic Polymers Corporation or an approved equal. Applied to all interior manhole surfaces.

2.6 Preformed Joint Material

Plastic or mastic as recommended by the barrel section manufacturer. Resistant to sewer environment to provide water tight seal between concrete sections. Preformed joint material shall be Ram-Nek, Kent Seal, or equal.

2.7 Non Shrink Grout

ASTM C1107, prepackaged

2.8 Frame and Cover

ASTM A48, Class 30. The cover and frame will be a locking non-ventilated type. The word "sewer" shall be cast into the top of the lid. The bearing surfaces of the frames and covers shall be machined and the cover shall seat firmly on a gasket mounted in the frame without rocking. Painted or dipped in commercial quality asphaltic paint. Frame and cover shall be a model GTS as manufactured by Pont-a-Mousson Everett Enterprises, Inc. or approved equal. Provide a concrete collar around the frame.

PART 3 – EXECUTION

3.1 Preliminary Investigation of the Work

Verify all preliminary work has been performed in accordance with the plans and specifications prior to manhole construction.

3.2 Excavation, Backfill and Compaction

Prepare subgrade and bedding in accordance with Specification Section 2300, Trench Excavation and Backfill. Provide bedding to depth and density indicated. Place and compact bedding and backfill with the same material and to the same density indicated for the adjacent trench.

3.3 Manhole Base

A. Precast Concrete Base

Place precast base to the line and elevations indicated on firm, dense bedding. Join base to pipe per manufacturer's recommendations and as specified herein. Coat with Polymorphic Polymer coating.

B. Cast In Place Concrete Base

Construct cast in place concrete base per Specification Section 3300, Concrete Structures, to the line and elevation indicated. Place concrete with pipe ends firmly held in position and with waterstops in place. Consolidate concrete as required to provide dense, impermeable base. Shape invert channels to a smooth semi-circular shape to match diameter of pipe. Make direction changes of flow with a smooth curve having a radius as large as possible. Change grade and size of channel gradually and evenly.

Construct joint on base to receive manhole barrel section. Coat with polymorphic Polymer coating.

When constructing manhole bases over an existing pipe, provide waterstops and place concrete to the springline of the existing pipe. Cut out the top half of the existing line after the concrete has set and grind exposed edges smooth. Leave the existing pipe in the channel.

3.4 Sections and Extensions

Place each section and extension plumb. Join sections with a full bed of preformed joint material. Cut off excess joint material to provide space for at least ¼ inch depth of grout. Grout smooth the interior and exterior of the joint after the mastic has set.

3.5 Final Adjustment to Grade

Adjust frame and cover to required elevation with manhole extensions. Do not exceed maximum dimensions of 18 inches between the top of the frame and the top of the precast cone or flat slab. Use preformed joint material to provide water tight seal between extension sections. Grout smooth the interior surface of sections and extensions.

3.6 Frame and Cover

Place frame and cover to the elevation indicated or required to match surface conditions. Construct concrete collar as indicated.

3.7 Abandon Existing Manhole

At the location indicated on the plan, abandon the existing sewer manhole by removing all existing manhole components to at least three (3) feet below the existing grade, plug the pipe ends and backfill the voids from the excavation and remaining portion of the existing manhole.

Remove the existing frame, cover, concrete collar, grade rings, cone sections, flat top sections, and barrel sections as required to at least three (3) feet below the existing grade. Plug all pipe ends exposed by the excavation and inside the manhole. Pipe plugs shall be concrete and extend at least 2 feet into the existing pipe to provide a permanent seal against water and soil intrusion. Place and compact select or granular backfill to the existing finish grade per specification section "Trench Excavation and Backfill".

3.8 Adjust Existing Manhole Rim to Finished Grade

Adjust all existing manhole frame and covers to finished grade elevations. The elevation adjustment shall be accomplished by the removal and replacement of the existing components as required. Remove the frame and cover, grade rings, cone sections, flat top sections and barrel sections to the depth required to replace the components to the desired elevation. Furnish and install new or salvaged components in accordance with this specification. Salvaged components shall only be incorporated into the new work if they meet the quality standards of new materials specified herein and are not visibly damaged beyond simple repair. The **OWNER** shall make all decisions regarding the reuse of salvaged material before the salvaged material is incorporated into the work. All decisions by the **OWNER** shall be final. Provide concrete collar around frame after final adjustment. The concrete shall be protected from traffic for a minimum of 48 hours.

3.9 Water Line Separation

When constructing sewer manholes near water lines, the ADEQ regulations governing this type of work shall be used, as follows. No water pipe shall pass through or come in contact with any part of the sewer manhole. The minimum horizontal separation between water mains and manholes shall be six feet, measured from the center of the manhole.

PART 4 – MEASUREMENT AND PAYMENT

4.1 Measurement

A. Sanitary Sewer Manhole, Storm Drain Manhole, Manhole Over Existing Line, Abandon Existing Manhole

Measurement of manhole construction will be the number per each.

B. Adjust Existing Manhole Rim to Finish Grade

Measurement of this item will be the number of each existing manhole rims that are adjusted to finished grade.

4.2 Payment

A. Sanitary Sewer Manhole, Storm Drain Manhole, and Manhole Over Existing Line.

Payment for each manhole will be based on the contract unit price for each manhole and shall be considered as full payment for furnishing and installing the manhole, including excavation, backfill, connecting new and existing pipes, the concrete base, barrel sections, cones or flat slabs, extensions, rim and cover, any necessary surface repair, and all miscellaneous work and materials required to complete the work.

B. Abandon Existing Manhole

Payment for abandoning existing manholes will be based on the contract unit price per each and shall be full compensation for excavation, removal of existing components, furnishing all materials required and backfilling required to complete the work.

C. Adjust Existing Manhole Rim to Finish Grade

Payment for adjusting existing manhole rims will be based on the unit price per each and shall be full compensation for furnishing and installing all materials and work required to complete the item.

See Section 00310 Bid Schedule for Bid Items.

****END OF SECTION****