

SECTION 027205
FIBERGLASS MANHOLES

1. DESCRIPTION

This specification shall govern all work required for providing, installing and adjusting fiberglass manholes required to complete the project.

2. GENERAL

Fiberglass manholes shall be installed at the locations indicated on the drawings.

3. MATERIALS

A. Manholes

Fiberglass manholes shall be fabricated in accordance with ASTM D3753-“Standard Specification for Glass-Fiber-Reinforced Polyester Manholes and Wetwells,” latest edition, and the referenced design criteria as follows:

1. ASTM C581 Standard Practice for Determining Chemical Resistance of Thermosetting Resins Used in Glass-Fiber-Reinforced Structures Intended for Liquid Service
2. ASTM D695 Standard Test Method for Compressive Properties of Rigid Plastics
3. ASTM D790 Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
4. ASTM C923 Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
5. ASTM D2412 Standard Test Method for Determination of External Loading Characteristics of Plastic Pipe by Parallel-Plate Loading
6. ASTM D2583 Standard Test Method for Indentation Hardness of Rigid Plastics by Means of a Barcol Impressor
7. ASTM D2584 Standard Test Method for Ignition Loss of Cured Reinforced Resins
8. ASTM D3034 Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
9. ASTM F794 Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe and Fittings Based on Controlled Inside Diameter
10. ASTM C32 Standard Specification for Sewer and Manhole Brick (Made From Clay or Shale)

The minimum wall thickness for all fiberglass manholes at all depths shall be 0.50 inch. The inside diameter of the manhole barrel shall be a minimum of 48 inches or as otherwise specified on the drawings, but shall not be less than 1.5 times the nominal pipe diameter of the largest pipe, whichever is larger. A concentric reducer over the barrel shall have a

minimum inside diameter of 31.75 inches at the top, unless otherwise indicated on the drawings.

B. Manhole Pipe Connectors

Manhole pipe connectors for Sanitary Sewer Application shall be made of corrosion resistant plastic. The connector shall eliminate leaks around the pipe entering the manhole wall and shall permit pipe movement without loss of seal integrity, and shall be in conformance with ASTM D3212. Material for elastomeric seal in push-on joints shall meet the requirements of ASTM F477. Material for rubber sleeve shall meet the requirements of ASTM C443. Manhole pipe connectors between 4 inches and 15 inches shall be Inserta Tee from Fowler Mfg., or approved equal.

Manhole pipe connection for Storm Sewer Application shall be made with Ram-Nek flexible plastic gasket material as manufactured by K.T. Snyder Company of Houston, Texas, or approved equal, and wrapped with Class 'A' Subsurface Drainage Geotextile, AASHTO M288.

C. Manhole Base

Concrete shall be Class 'A' in accordance with City Standard Specification Section 030020 "Portland Cement Concrete".

Caulk for seal between fiberglass manhole and concrete cast-in-place base shall be Epo-Flex epoxy (gun grade consistency) as manufactured by Dewey Supply of Corpus Christi, Texas, or approved equal.

Precast reinforced concrete manhole base shall be in accordance with the requirements of ASTM C478, as shown on the construction plans and detail drawings.

D. Inflow Inhibitors

Inflow inhibitors shall be installed in sanitary manholes. They shall be of 316 stainless steel with an equivalent thickness of not less than 18 gauge, and load tested in excess of 3000 pounds. The inhibitor shall rest on the lip of the seating surface of the manhole ring and shall not exceed a depth of 6.5 inches. The seating surface of the inhibitor shall have an attached gasket on the weight-bearing side. The inhibitor shall have a gas relief valve made of Nitrite and shall operate at a one (1) psi differential pressure. The inhibitor shall be fitted with a handle of 3/16 plastic coated stainless steel cable attached to the insert body with a 6# 316 stainless steel rivet. The inhibitor shall be constructed of materials that withstand highly corrosive sewer gases.

E. Ring and Cover

Manhole ring and cover for all manholes shall be for street application and shall be as indicated on the drawings. Manholes 5 feet in diameter and larger shall require a nominal 3-foot ring and cover, as specified on the drawings. HDPE adjustment rings are to be used for

grade adjustments. A maximum of 18" of adjustment rings may be utilized.

F. Flowable Grout

Flowable grout (or flowable fill) shall consist of a mixture containing Portland cement, fly ash, sand, water, and "Darafill" admixture (or approved equivalent), in the amounts shown below (or otherwise proportioned to provide 100 psi compressive strength at 28 days), to achieve a paste-like consistency immediately prior to placing the flowable grout. The flowable grout mixture shall be supplied by an approved ready-mix supplier. The manufacturer's representative shall be consulted for any final adjustments to improve the flowability of the mixture. Commercially produced flowable grout may be used with approval of the Engineer.

100 lbs/ CY	Portland Cement
300 lbs/ CY	Fly Ash
2100 lbs/ CY	Sand
250 lbs/ CY	Water
6 oz/ CY	"Darafill" admixture, as manufactured by Grace Construction Products, or approved equivalent.

4. CONSTRUCTION METHODS

General: The limits of excavation shall allow for placing and removing forms, installing sheeting, shoring, bracing, etc. The Contractor shall pile excavated material in a manner that will not endanger the work and will avoid obstructing sidewalks, driveways, power poles, drainage structures, streets, etc. Subgrade under manhole footings shall be compacted to not less than 95% Standard Proctor density.

Vertical Sides: When necessary to protect other improvements, the Contractor shall maintain vertical sides on the excavation. The limits shall not exceed three feet outside the footing on a vertical plane parallel to the footing except where specifically approved otherwise by the Engineer. The Contractor shall provide and install any sheeting, shoring, and bracing as necessary to provide a safe work area as required to protect workmen, structures, equipment, power poles, etc. The Contractor shall be responsible for the design and adequacy of all sheeting, shoring and bracing. The sheeting, shoring, and bracing shall be removed as the excavation is backfilled.

Sloping Sides: In unimproved areas where sufficient space is available, the Contractor will be allowed to back slope the sides of the excavation. The back slope shall be such that the excavation will be safe from caving. Safety requirements shall govern the back slope used.

De-watering: The Contractor shall keep the excavation free from water by use of cofferdams, bailing, pumping, well pointing, or any combination, as the particular situation may warrant. All de-watering devices shall be installed in such a manner as to provide clearance for construction, removal of forms, and inspection of exterior of form work. It is the intent of these specifications that the foundation be placed on a firm dry bed. The foundation bed shall be kept in a de-watered condition for a sufficient period of time to

insure the safety of the structure, but in no case shall de-watering be terminated sooner than seven (7) days after placing concrete. All de-watering methods and procedures are subject to the approval of the Engineer. The excavation shall be inspected and approved by the Engineer before work on the structure is started. The Contractor shall provide a relatively smooth, firm foundation bed for footings and slabs that bear directly on the undisturbed earth without additional cost to the City, regardless of the soil conditions encountered. The Engineer will be the sole judge as to whether these conditions have been met. The Contractor shall pile excavated material in a manner that will not create an unsafe condition.

Unauthorized Over-Excavation: Excavation for slabs, footings, etc., that rest on earth, shall not be carried below the elevation shown on the drawings. In the event the excavation is carried below the indicated elevation, the Contractor shall bring the slab, footing, etc., to the required grade by filling with concrete.

Wall Preparation for Pipe Penetrations: For sanitary sewer application, pipe penetrations for pipe sizes 4-inch through 15-inch shall be made with appropriately sized core drill bits recommended by the manufacturer. Pipe penetrations other than described above and as authorized by the Engineer shall be made as follows: cut shall be equal to the outside diameter of pipe to pass through it, plus 1/2 inch. Cuts are to be made using electric or gasoline powered circular saw with masonry blade. Impact type tools shall not be used.

Handling: Manholes shall be handled and stored in a safe manner as necessary to prevent damaging either the manhole or the surroundings. If manhole must be moved by rolling, the ground which it traverses shall be smooth and free of rocks, debris, etc. Manholes shall be lifted as specified by the manufacturer.

Height Adjustment: If necessary, utilize HDPE adjustment rings to adjust the manhole to the correct grade elevation. A maximum of 18" of adjustment rings may be utilized.

Installation: Lower manhole into wet concrete until it rests at the proper elevation, and a minimum of six (6) inches into concrete, then plumb.

Backfill Material: Unless shown otherwise on the drawings, initial backfill around manholes (from subgrade to five feet (5') above the top of the concrete footing) shall be flowable grout. The remaining final backfill around manholes shall be cement-stabilized sand, or approved equal, containing a minimum of 2 sacks of standard Type I or Type II Portland cement per cubic yard of sand, free of large hard lumps, rock fragments or other debris. The material shall be free of large lumps or clods which will not readily break down under compaction. This material shall be subject to approval by the Engineer. Backfill material shall be free of vegetation or other extraneous material. Topsoil should be stockpiled separately and used for finish grading around the structure, if necessary.

Schedule of Backfilling: The Contractor may begin backfilling around manhole as soon as the concrete has been allowed to cure and the forms removed.

Compaction: Backfill shall be placed in layers not to exceed 6 inches compacted thickness and mechanically tamped to at least 95% Standard Proctor density (ASTM D698). Backfill shall be placed in such a manner as to prevent any wedging action against the structure.

Contractor shall follow operational requirements for bypass pumping as set forth in City Standard Specification Section 027200 "Control of Wastewater Flows".

5. TESTING

Manholes shall be tested for leakage by either of two tests as specified by the Engineer.

Water Leakage Test:

The Contractor shall provide water, labor, and materials for testing.

Testing shall be as follows:

1. With sewers plugged, the manhole shall be filled with water.
2. The manhole shall be checked after 24 hours have elapsed.
3. Water loss shall not exceed 2.4 gallons per foot of depth for the 24-hour period for 4-foot diameter manholes, or 3.0 gallons per foot of depth for the 24-hour period for 5-foot diameter manholes. Water loss shall not exceed 0.6 gallon per foot of diameter per foot of depth for the 24-hour period for all sizes of sanitary manholes.
4. If the manhole is within 9 feet of a waterline that is not or cannot be encased, the manhole shall be tested for no leaks and no noticeable loss of water shall be experienced for the 24-hour period.

If water loss is excessive, the Contractor shall correct the problem and the manhole shall be retested.

Vacuum Test:

Vacuum testing shall be in accordance with City Standard Specification Section 027203 "Vacuum Testing of Wastewater Manholes and Structures".

6. GRADE ADJUSTMENT OF EXISTING FIBERGLASS MANHOLES

The adjustment of the ring and cover is to be achieved by removal or addition of HDPE grade adjustment rings that rest above the fiberglass corbel. If the ring and cover must be lowered to the extent that the new elevation cannot be achieved by removal of adjustment rings and it is necessary to remove a section of the fiberglass manhole, this work shall be done as described below.

Note that manhole repair kits are available for this work.

Remove the appropriately sized section of the existing manhole from the vertical manhole wall at least 6 inches below the seam where the corbel meets the vertical wall.

Excavate evenly around the manhole as required.

Mark, cut and remove the required section of the manhole. Make a square cut as necessary for a good butt splice.

Grind and clean ends of fiberglass that are to be re-united.

Replace and align the top. Fiberglass a 6-inch strip along the outside seam all around with two layers of mat with one layer of woven roving sandwiched between.

After the outside has set, go on the inside and fill any voids in the seam with epoxy or material provided by the manhole manufacturer for use in such application.

After the putty has set, fiberglass a 6-inch strip on the inside as previously done on the outside.

After curing, backfill with cement-stabilized sand, as described above, compacted to a minimum of 95% Standard Proctor density (ASTM D698) or as directed by the Engineer or his designated representative.

7. MEASUREMENT AND PAYMENT

Unless otherwise specified on the Bid Form, fiberglass manholes shall be measured per each for each size (diameter) of manhole indicated.

Payment shall be made at the unit price bid and shall fully compensate the Contractor for all materials, labor, tools, equipment, and incidentals required to complete the work. Payment shall include, but not be limited to; excavation, dewatering, compaction, concrete foundation, manhole assembly, connections, cast iron frame and cover, adjustment to finish grade, concrete work, backfill, leakage testing, bypass pumping, and other work as required to complete the fiberglass manhole.

Extra depth for a sanitary manhole over 6 feet in depth will be measured by the vertical foot of depth in excess of 6 feet and bid as "Extra Depth for Manhole (Wastewater)".

Rehabilitation of existing manholes with fiberglass inserts shall be measured by each individual structure rehabilitated, and paid for at the unit price bid per each, of the size, type and depth specified, complete in-place, and meeting the approval of the Engineer. "Complete in-place" shall mean all labor, materials, tools, equipment and incidentals necessary to furnish and install the rigid fiberglass manhole inserts, make connections, grout the annular space with flowable grout, backfilling, leakage testing, and adjust the manholes to finish grade.