SECTION 02711 - FRP MANHOLE INSERTS

City of San Diego, CWP Guidelines

PART 1 -- GENERAL

1.1 WORK OF THIS SECTION

A. The WORK of this Section includes providing fiber glass reinforced polyester (FRP) manhole inserts such that rehabilitated manholes become structurally sound and impervious to ground water, soil, and debris, and become resistant to hydrogen sulfide (sulfuric acid) corrosion.

B. The CONTRACTOR is cautioned that sewage will continue to flow to the manholes and that the WORK must be performed under permit required for confined space entry conditions.

1.2 RELATED SECTIONS

A. The WORK of the following sections applies to the WORK of this Section. Other Sections of the Specifications, not referenced below, shall also apply to the extent required for proper performance of this WORK.

1. Section 03300–Cast-In-Place Structural Concrete
2. Section 02575–Pavement Rehabilitation

1.3 SPECIFICATIONS AND STANDARDS

A. Except as otherwise indicated, the current editions of the following apply to the WORK of this Section.

ASTM D 3753 Glass-Fiber-Reinforced Polyester Manholes

1.4 SHOP DRAWINGS AND SAMPLES

A. The following shall be submitted in compliance with Section 01300:

1. Design and fabrication details for fiber glass manhole components

2. Manufacturer's installation instructions

3. Manufacturer's data and details for materials to be used for grout and pipe connections

4. Manufacturer's certification that manhole inserts comply with the requirements of this Section, including the chemical resistance criterion.

PART 2 -- PRODUCTS

2.1 WALL CLEANING

A. **High Pressure Water:** Water at 3500 psi minimum pressure.

2.2 BENCH-FORMING AND REPAIR MATERIALS

A. Concrete shall be lean, Type V, in accordance with Section 03300.

B. Leak repair material manufacturers, or equal:

1. Thoro System Products, Waterplug

2. Five Star Products, Inc., Structural Concrete Underwater HP

2.3 FRP INSERTS

A. Inserts shall comply with ASTM D 3753 and the following:

1. Inserts shall be single piece barrel and [concentric] [eccentric] reducer construction without seams, joints, or sections, comprised of chopped strand and continuous fiber glass reinforcement within isophthalic polyester resin containing finely-graded sand. Materials shall be resistant to corrosive attack from sanitary sewage and sewer gases including sulfuric acid and shall satisfy the 100,000 hour criterion in ASTM D 3753.

2. Interior and exterior surfaces shall be relatively smooth and be free of sharp projections and protruding glass fibers. No blisters or delaminations shall be visible.

3. Inserts shall be sized to fit inside existing manholes and allow grade rings and frame between the top and finish grade. Wall thickness shall provide for an AASHTO H-20 load rating and wall stiffness of 36 psi minimum.

4. **Manufacturer:** Flowtite Rehabilitation Manhole by Fluid Containment, Inc., or equal.

B. Sealants

1. Sealant between the FRP reducer and frame shall be Baysilone 600 by Mobay Chemical or equal.

2. Sealant between FRP insert and the surfaces of the manhole base shall be a quick-setting grout.

C. **Grout:** Grout between the FRP insert and the manhole wall shall be either of the following or equal:

1. Portland cement type I; 5 sacks per cubic yard; water to cement ratio of 0.5 or less.

2. Halliburton LG-3 grouting system; compressive strength of 1500 psi at 28 days.

[D. **Protective Coating:** Vinyl ester material with demonstrated successful long term service life in sanitary manhole wall surface application. Filler-sealer shall be a 100 percent solids amine cure epoxy or vinyl material, compatible with the vinyl ester material above and appropriate for forming a relatively smooth surface on concrete when applied with a squeegee.]

PART 3 -- EXECUTION

3.1 DIVERSION PUMPING

A. Install and operate sewage diversion pumping equipment to maintain sewage flows without backup, overflow, or spill.

3.2 CLEANING AND SURFACE PREPARATION

A. Remove dirt, grease, and debris from floor and interior walls of manhole using high pressure water and cleaners as necessary.

B. Deteriorated invert and bench surfaces shall be abrasive blasted to roughen the surface in accordance with Section 03300. Compressed air shall be supplied from compressors fitted with oil/moisture separators. Surfaces shall be cleaned of dust and grit particles by dry air blast cleaning, vacuum cleaning, or wiping with a tack cloth. Used abrasives shall be collected and removed without allowing any to enter the sewage stream.

3.3 REPAIRS

A. Active leaks, if present, shall be sealed by application of leak repair material in accordance with the manufacturer's instructions.

B. Repair and reshape manhole inverts and benches according to the requirements of Section 03300. Inverts shall be U-shaped and have a minimum depth of 1/2 pipe diameter. Benches shall have smooth surfaces without defects that allow debris to accumulate.

3.4 INSERT INSTALLATION

A. Remove pavement if present in accordance with Section 02575. Excavate around the manhole as necessary to prevent soil and debris from falling into manhole while frame and grade rings are removed. Set aside frame and cover for reuse in rehabilitated manhole.

B. Cut the FRP insert or chip the concrete benches so that the insert will be evenly supported when lowered into place. Accurately locate incoming and outgoing sewer lines and cut the FRP insert for a close fit within 1 inch to both. Seal the cut edges with resin.

C. Lower the FRP insert into a 4-inch deep layer of quick-setting grout mixture, making sure that the sewer lines and insert openings align.

D. Place a 6-inch deep layer of quick-setting grout at the bottom of the annular space between the FRP insert and the wall.

E. Seal the sewer openings with Oakum soaked in sealing gel.

F. Fill the remaining annular space with grout. Consolidate the grout without damage to the insert.

G. Install the grade rings, frame, and cover, sealing the surfaces between the reducer, the grade rings, and the frame.

H. Replace pavement if any was removed, according to Section 02575.

[3.5 PROTECTIVE COATING

A. All oil and grease on chimney surface shall be removed by detergent cleaning with solvent, vapor, alkali, emulsion, or steam.

B. Follow detergent cleaning with abrasive blast cleaning to remove laitance and deteriorated concrete and to roughen the surface equivalent to No. 80 grit flint sandpaper.

C. Surfaces shall be clean and dry prior to coating.

D. To the chimney, bench and invert, and quick set grout which seals the bottom edge of the FRP insert, apply 2 coats of filler-sealer with a squeegee as necessary to achieve a smooth void-free surface.

E. Apply 2 or more coats of vinyl ester material to achieve a total DFT of 40 mils.]

** END OF SECTION **