

**ITEM NO. 855**

**Reconstruction of Existing Manholes**

**855.1 DESCRIPTION:** This item shall consist of the reconstruction of all existing manholes, all types and sizes, to include the replacement of manhole ring and covers, the cones, manhole section(s) required regardless of type shown in the contract documents and in conformity with the provisions of these specifications.

**855.2 REFERENCED STANDARDS:** Reference standards cited in this Specification Item No. 855 refer to the current reference standard published at the time of the latest revision date.

1. San Antonio Water System (SAWS):
  - a. Specifications for Water and Sanitary Sewer Construction
  - b. SAWS Materials Specifications
2. City of San Antonio (COSA) Specifications for Construction
3. Texas Commission of Environmental Quality (TCEQ)
  - a. Chapter 217 Design Criteria for Domestic Wastewater Systems
  - b. Chapter 213 ("Edwards Aquifer")
4. AASHTO – American Association of State Highway and Transportation Officials:
  - a. M306: Standard Specification for Drainage, Sewer, Utility, and Related Castings.
5. ASTM – American Society for Testing and Materials:
  - a. A536: Standard Specification for Ductile Iron Castings.
  - b. C478: Standard Specification for Circular Precast Reinforced Concrete Manhole Sections.
  - c. D638: Test Method for Tensile Properties of Plastics.
  - d. D648: Standard Test Method for Deflection Temperature of Plastics under Flexural Load in the Edgewise Position.
  - e. D790: Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials.
  - f. D1238: Standard Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer.
  - g. D1505: Standard Test Method for Density of Plastics by the Density-Gradient Technique.
  - h. D1693: Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics.

**855.3 SUBMITTALS:** Contractor shall submit manufacturer's product data, instructions, recommendations, shop drawings, and certifications. All submittals shall be in accordance with Engineer's requirements and submittals shall be approved by the Engineer prior to delivery.

1. Submit proposed methods, equipment, materials and sequence of operations for sewer construction.
2. Plan operations so as to minimize disruption of utilities to occupied facilities or adjacent property.
3. Submit all test reports and pre and post sewer television inspection video.

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4. Videos become property of SAWS.

### **855.4 MATERIALS:**

1. All reconstructed manholes shall be watertight and coated with a SAWS-approved sewer coating. See SAWS APL.
2. Existing Monolithic Manholes are not to be reconstructed, but replaced under Specification Item No. 852, "Sanitary Sewer Manholes" or Specification Item No. 850, "Polymer Concrete Sanitary Sewer Structures."
3. Precast Reinforced Concrete Manhole Sections: Precast reinforced concrete manhole sections shall conform to the requirements of ASTM Designation C478-12a.
4. Mortar: Mortar shall be composed of 1 part Portland Cement, 2 parts sand and sufficient water to produce a workable mixture. When used to plaster manholes, it may be composed of 1 part cement to 3 parts sand. Lime up to 10% may be used.
5. The manhole ring and cover shall be of ductile iron or gray cast iron construction. The cover shall be solid with no vent or pick holes; hinged with underlying special hinge area leakage protection; the cover secured with four (4) stainless steel bolts; and shall have a recessed "pick bar" for cover opening. Cam lock type covers shall not be allowed.
  - a. Approved manufacturers, as listed in the SAWS APL, have previously completed required inflow leakage shop testing and have met a maximum allowable leakage rate criterion
  - b. Nominal cover diameter shall be 32 inches, with 30 inch clear opening, as required by TCEQ
  - c. Vented Manhole Covers will be specified by Engineer.
6. "Throat rings" shall be made of HDPE and have a maximum thickness of 2 inches.
  - a. The internal diameter shall match that of the ring and cover's opening. HDPE "throat rings" are to be used in conjunction with a UV stabilized internal polyethylene liner for the purpose of providing an infiltration/inflow (I/I) barrier. Concrete rings are not allowed.
  - b. The I/I Barrier shall be as manufactured by Strike Tool Products of Cannon Falls, MN. See SAWS APL.
  - c. "Throat rings" are limited to a minimum of two and a maximum of four rings for reconstructed manholes
  - d. Throat rings shall be a maximum thickness of two (2) inches.
7. Bitumastic Joint Sealant, flat tops, and between the ductile or gray cast iron ring (frame) and the uppermost adjustment ring or flat top: See Approved APL.
8. Interior Coating: The interior of all new and rehabilitated manholes shall be rendered watertight, chemically resistant, and abrasion resistant through the use of a SAWS approved sewer coating. See SAWS APL
  - a. Prior to coating, all manholes shall be hydrostatic test and/or vacuum tested, and approved by Inspector or Engineer.
  - b. For existing structures to be rehabilitated; first, apply a combination of cementitious coatings followed by an approved epoxy coating. List of

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- c. current approved coatings is listed in SAWS most current APL. Kerneos SewperCoat 2000 HS and PG, applied at the required one inch thick application, is the only product approved which does not require a subsequent epoxy coating.
  - d. Each component or separate piece of the manholes structure shall be marked with a tag or stamp that clearly and legibly identifies the coating manufacturer, coating product utilized and date of installation. Tag and/or stamp shall be placed in a location that can clearly be seen within the manhole or structure.
- 9. Other approved materials are located on SAWS website under SAWS APL. The list is periodically updated and should be checked by Contractor prior to start of construction.

### **855.5 CONSTRUCTION:** Manholes shall be raised or lowered by replacing the existing cone and manhole section or sections as required for installation to the finished surface course.

- 1. All openings shall be protected by hatch covers or the necessary steel plates.
- 2. The Contractor shall be required to backfill all manholes to one foot above the top of the cone section to allow for the concrete ring encasement.
- 3. All excess materials (of any type) shall be disposed of by the Contractor at his own expense, and in an approved location.
- 4. Reconstructed manholes shall also be cleaned of any debris as required by the Inspector.
- 5. If a new manhole cover, ring, or reconstructed manhole is damaged by the Contractor, it shall be replaced (as directed by Inspector) by the Contractor at his own expense.
- 6. All installed throat rings must be used in conjunction with a UV stabilized polyethylene liner and I/I barrier. See SAWS APL
- 7. For reconstructed existing manholes, apply a combination of both products with the cementitious coating first, followed by the epoxy coating. Kerneos SewperCoat 2000 HS and PG, applied at the required one inch thick application, is the only product approved which does not require a subsequent epoxy coating.
- 8. For existing structures scheduled to be rehabilitated, Contractors shall apply a combination of a cementitious coating first, followed by the epoxy coating. List of approved coatings are listed on SAWS Material Specifications.
- 9. Other approved materials are listed in SAWS APL

### **855.6 TESTING:** The Contractor shall notify Inspector and Engineer 48 hours prior to beginning of manhole testing.

- 1. The Contractor shall perform the testing for all sanitary sewer manholes in accordance with the following:
- 2. All manholes must pass a leakage test.
- 3. The Contractor shall test each manhole (after assembly and backfilling) for leakage, separate and independent of all other sanitary sewer piping, by means of either a hydrostatic test, vacuum test, or other methods approved by the Engineer.
- 4. The Contractor is hereby instructed to conduct either of the two identified tests

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in the following manner:

- a. Hydrostatic testing shall be conducted by utilizing approved plugs to seal all influent and effluent pipes in the manhole and filling the manhole to the top of the cone with water.
  - (1) Additional water may be added over a 24-hour period to compensate for absorption and evaporation losses.
  - (2) At the conclusion of the 24- hour saturation period, the manhole shall be filled to the top and observed.
  - (3) Any measureable loss within a 30 minute period shall be considered an unsuccessful test and thus require the Contractor to assess the needed repairs, perform such repairs (subject to the approval of the Engineer), and notify the Inspector when the retest will be performed.
  - (4) All effort, materials, or other costs shall be solely at the Contractor's expense.
- b. Vacuum Testing: Manholes shall be tested after construction/ installation and backfilling with all connections (existing and/or proposed) in place.
  - (1) Drop- connections and gas sealing connections shall be installed prior to testing.
  - (2) The lines entering the manhole shall be temporarily plugged with the plugs braced to prevent them from being drawn into the manhole.
  - (3) The plugs shall be installed in the lines beyond drop connections, gas sealing connections, etc.
  - (4) Prior to performing the test, the Contractor shall plug all lift holes and exterior joints with a non-shrink grout and plug all pipes entering the manhole.
  - (5) No grout shall be placed in horizontal joints prior to testing.
  - (6) Contractor shall use a minimum 60 inch-lb. torque wrench to tighten the external clamps that secure the test cover to the top of the manhole.
  - (7) The test head shall be inflated in accordance with the manufacturer's recommendations.
  - (8) A vacuum of 10 inches of mercury shall be drawn, and the vacuum pump will be turned off.
  - (9) With the valve closed, the level vacuum shall be read after the required test time.
  - (10) If the drop in the level is less than 1 inch of mercury (final vacuum greater than 9 inches of mercury), the manhole will have passed the vacuum test.
  - (11) The required test time is 2 minutes.
- c. Acceptance: Any manhole which fails the initial test must be repaired with a non-shrink grout or other suitable material based on the material of which the manhole is constructed.
- d. The manhole shall be retested as described above until a successful test is attained.

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- e. After a successful test, the temporary plugs will be removed.
- f. To ensure that the plugs have been removed, Contractor shall only do so in the presence of the Inspector.
  - (1) Repairs to Existing Manholes: Any existing manhole which fails to pass the hydrostatic/vacuum test shall be closely examined by the Inspector and the Contractor to determine if the manhole can be repaired.
    - a. Thereafter, the Contractor shall either repair or remove and replace the manhole as directed.
    - b. The manhole shall then be retested and coated with a SAWS- approved sewer coating as stated above.
    - c. The Owner may elect to simply remove and replace the existing manhole with a new one.
    - d. Any manhole excavated for repairs or excavated for tie in, shall be backfilled with to one foot above the top of the cone section to allow for the concrete ring encasement
    - e. The Contractor also has the option of backfilling with approved secondary materials, subject to the provisions of Specification Item No. 804, "Excavation, Trenching and Backfill."
  - (2) Holiday Testing: Inspect each sanitary sewer manhole using high-voltage holiday detection equipment.
    - a. All detected holidays shall be marked and repaired by abrading the coating surface with grit disk paper, or other hand tooling method.
    - b. After abrading and cleaning, additional protective coating material shall be applied to the repair area.
    - c. All touch-up repair procedures shall follow the protective coating manufacturer's recommendations
- 5. If a sanitary manhole fails to pass one of the above tests, it shall be repaired in accordance with the manufacturer's recommendations and re-tested.
- 6. It shall not be accepted until it passes all tests.
- 7. All repairs and re-testing shall be at no additional cost to SAWS.
- 8. Engineer of Record must witness all tests over the EARZ.

**855.7 MEASUREMENT:** All reconstructed manholes will be measured by the unit of each manhole (any type or size).

**855.8 PAYMENT:** The work performed as prescribed by this item will be paid for at the contract unit price bid per manhole for "Reconstruction of Existing Manholes," which price shall be full compensation for all excavation, backfill material including select backfill, flowable fill, manhole coating, manhole ring and cover, saw cutting of surfaces as required, I&I barrier, reinforced concrete/concrete, diversion of flow, bypass pumping, trench protection, and disposal of material excavated, sewer coating, and testing; for

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furnishing and placing all materials and for all labor, tools, equipment and incidentals necessary to complete the work.

1. Materials paid on site will be in accordance with Table 1 of Specification Item No. 100 "Mobilization."

**-End of specification-**