

SECTION 02531 - MANHOLES AND ACCESSORIES

PART 1 - GENERAL

- 1.1 **Includes:** Furnishing all labor, materials, supplies, and equipment necessary for the construction of manholes and manhole accessories for water distribution systems, sanitary sewers, sewage force mains, or storm sewers.
- 1.2 **Related Work:**
- A. SECTION 02316 - TRENCHING, BACKFILLING AND COMPACTION
 - B. SECTION 02530 - GRAVITY SANITARY SEWERS AND LATERALS
- 1.3 **Reference Standards:**
- A. Standard Specification for Precast Reinforced Concrete Manhole Sections, ASTM C478-07.
 - B. Standard Practice for Minimum Structural Design Loading for Monolithic or Sectional Precast Concrete Water and Wastewater Structures, ASTM C890-06.
 - C. Standard Practice for Installation of Underground Precast Concrete Utility Structures, ASTM C891-90(2003).
 - D. Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals, ASTM C923-07).
 - E. Standard Test Method for Concrete Manholes by Negative Air Pressure (Vacuum) Prior to Backfill, ASTM C1244-05ae1.
 - F. City of Emerson Water & Sewer Standard Detail Drawing, latest revision.
- 1.4 **Submittals:**
- A. Submit Shop Drawings for precast sections, steps, pipe joint seals, and frames and covers for approval before placing orders to suppliers for the job.
 - B. Submit manufacturer's certifications that all manholes and accessories have been manufactured in accordance with this Specification and that they meet all the standards referenced herein. Provide certified test results for manhole steps.
- 1.5 **Delivery, Storage and Handling:** Inspect manholes and accessories immediately upon delivery to ensure that no damaged or unsatisfactory materials are allowed on the job.

PART 2 - PRODUCTS

- 2.1 **General:** All products and materials shall be new. Used or reconditioned products and materials are not acceptable and shall be removed from the site. The Owner reserves the right to disallow any manufacturer or supplier that does not have a consistent, long-term record of quality control and successful product performance.
- 2.2 **Precast Manholes:** Materials and manufacture shall conform to ASTM C478. All manhole sections shall be wet-precast and furnished by the same manufacturer, unless otherwise

approved by the City Engineer. All manholes shall comply with Emerson Standard Manhole Details.

- A. Riser Sections: 4, 5 or 6 feet in diameter as required, with reducer rings for base sections of diameter greater than 4 feet.
- B. Top Sections: Eccentric cone top sections for manholes deeper than 5.5 feet; and flat slab tops for manholes 5.5 feet or less in depth. Flat slab tops to be reinforced concrete, designed for HS-20 traffic loading in accordance with ASTM C890, with eccentric manhole opening. Concentric cone top sections are not allowed.
- C. Base Sections: 4, 5 or 6 feet in diameter as required by the Drawings. Provide monolithically cast wall and bottom slab for all new sewers. Minimum height of bases shall be 48-inches, unless special manholes are required. Use precast "dog-house" section with poured-in-place bottom for manholes on existing sewers.
- D. Steps: Polypropylene plastic reinforced by a ½-inch diameter steel rod, ASTM A-615, Grade 60. Steps shall meet requirements of ASTM C478 and shall be installed by the manhole manufacturer.
- E. Exterior Coating: Coal Tar Bitumastic Super Service Black by Kop-Coat, or equal approved by the City Engineer. Coating shall be field applied only.

2.3 Frames and Covers:

- A. Standard: Equal to manhole frame and cover Model R-1736 or R-1777 by Neenah Foundry Co; USF 363 DS by U.S. Foundry & Mfg. Corp.; or V-1480-1 by East Jordan Iron Works, Inc. Provide mud ring. Provide solid cover concealed pick holes and "CITY OF EMERSON SANITARY SEWER" lettering (or "WATER" lettering if used for a water system appurtenance).
- B. Vented Cover: Only if designated on the Drawings, identical to those provided for standard frames and covers, except that cover shall have six, equally spaced, drilled holes 1/2 inch in diameter. Lettering same as for Standard Frame and Cover.
- C. Waterproof: Equal to Model R-1915-G2, Type P with bolted cover, by Neenah Foundry Company; USF 363 DS-BWT by U.S. Foundry & Mfg. Corp.; or V2480-1 by East Jordan Iron Works, Inc. Provide solid lid with four stainless steel bolts, 1/8 inch neoprene single-piece gasket, and lettering same as for Standard Frame and Cover.
- D. Flat Slab Tops and Manholes in Unpaved Areas: Frame shall be precast in the top slab or manhole cone. Covers shall Standard, Vented or Waterproof, as designated on the Drawings and shall be identical to those specified elsewhere.
- E. All manhole frames and covers for the project shall be furnished by a single manufacturer and shall not be delivered to site until submittals are approved by the City Engineer.

2.4 Joints:

- A. Riser Section Joint Seals: Butyl rubber rope equal to Ram-Nek, ConSeal CS-30R, or Kent-Seal No. 2 joint sealer.

- B. Riser Section External Seals: Flat butyl rubber sheet not less than 1/16" thick and 6" wide applied to the outside perimeter of the joint, Polywrap by RuVan Inc. or equal approved by the City Engineer.
 - C. Pipe-to-Manhole Connectors: Kor-N-Seal as manufactured by NPC Systems, Inc., or equal specifically approved by the City Engineer prior to shipment of manholes.
- 2.5 Grout: Embeco 167 Mortar, or equal non-shrink mortar specifically approved by the City Engineer.

PART 3 - EXECUTION

3.1 General:

- A. Construct and set all manholes in accordance with the Drawings and the Standard Manhole Details.
- B. Provide standard frames and covers unless otherwise noted on the Drawings or directed by the City Engineer.
- C. Where no special instructions are provided on the Drawings or in the field by the City's representative, set the top of manholes as follows:
 - (1) Outside of roads, streets, or shoulders, set the top level and 24 inches above the existing or proposed grade of the surrounding landscape. Cast-in-place frames and covers shall be used for all manholes outside of paved areas.
 - (2) In roads, streets, road shoulders, sidewalks, and lawns, adjust the tops flush with the proposed finished surface. Maximum vertical adjustment shall be 9 inches. On sloped surfaces, adjust the top of manhole as an angle as necessary to conform to slope or gradient of the proposed or existing finished surface or pavement.

3.2 Preparation:

- A. Excavate strictly in accordance with applicable OSHA regulations and requirements and maintain a safe work area at all times.
- B. Do not install manholes in excavations containing water or on fluid soil. Prior to installation, de-water each excavation as necessary in accordance with Specification Section 02316 – Trenching, Backfilling and Compaction. Maintain a dry excavation until the manhole has been completely installed, tested, and backfilled.
- C. Prepare an unyielding foundation of crushed stone, 12 inch minimum compacted thickness, as shown on the Drawings, prior to installation of base section.

3.3 Installation:

- A. Align eccentric manhole openings longitudinally over the main sewer, unless otherwise directed by the City Engineer.
- B. Set the bottom as near practical to the required grade to ensure that a properly grouted channel can be provided. Manholes must be vertical, no exceptions.

- C. Whenever the difference in elevation between the inlet and outlet sewer inverts exceed 2 ft. an outside drop connection must be provided. Inside drops are not allowed.
 - D. Carefully assemble manhole sections and sewer entrance using gusseted joints installed in accordance with the manufacturer's recommendations to ensure a tight and permanent fit. Seal joints between sections with Ram-Nek, ConSeal CS-30R, or Kent-Seal No. 2 joint sealer. Do not use grout in horizontal manhole joints.
 - E. Using approved non-shrink epoxy grout, fill all lift holes, inside and out, whether or not the lift holes penetrate through manhole walls. Fill lift holes prior to manhole coating and backfilling.
 - F. Do not use grouting or caulking of any kind in the interior horizontal joints of manhole sections prior to vacuum testing and approval. Wipe grout in the interior horizontal joint only upon final manhole testing and approval.
 - G. If manhole step installation is required in the field, use approved epoxy grout.
 - H. After manhole testing, approval and acceptance, construct invert channels as shown on the Standard Detail Drawings for Manhole Inverts. Use 1:2 (cement:sand) mortar to provide smooth channel through pipe inlets to true line and grade as shown on the Drawings. Concrete blocks or bricks may be used for fill in deep base sections under mortar. Provide 3 inch minimum thickness of mortar over filler block or brick. Precast manhole inverts are not acceptable.
 - I. Provide precast concrete rings as required at top section to adjust to finished grade. Install with non-shrink grout. Adjustment using brick courses is not allowed unless specifically approved. Maximum height of adjustment shall be 9 inches.
- 3.4 Exterior Coating: Field coat exterior of manhole (including leveling rings and base of frame) with approved coal tar bitumastic coating in accordance with coating manufacturer's directions, 16 mil minimum thickness. If coating is brushed (rather than sprayed) take care to thoroughly coat all surface irregularities and joints. Fill lift holes prior to coating. Allow ample time for exterior coating to dry completely before leakage testing and backfilling. **DO NOT APPLY COATING TO "GREEN", UNCURED CONCRETE.** No other coating or wrapping materials or systems shall be used to seal the exterior of any manhole.
- 3.5 Backfilling: Backfill and compact around manholes in accordance with Specification Section 02316 – Trenching, Backfilling and Compaction.
- A. Do not place permanent backfill until manhole leakage testing has been completed and approved.
 - B. Backfill with clean Native Material and compact as specified for pipe trenching at manhole excavations except those located fin existing pavement or areas to be paved.
 - C. For manholes located in existing or proposed streets or in other paved areas or areas to be paved, backfill with crusher run stone and compact as specified for pipe

trenching.

3.6 Inspection and Tests: All material and work shall be subject to inspection at any time. All inadequate, defective, or improper work or materials will be rejected and the Contractor will be required to replace or reconstruct the work.

- A. Provide 48 hour notice prior to testing and conduct all tests in presence of the City's representative.
- B. Prior to backfilling, conduct a vacuum leakage test on each completed sanitary sewer manhole in accordance with ASTM C1244. Place a vacuum of 10" Hg on the manhole as measured by an approved vacuum gauge. Maximum allowable vacuum loss shall be 1 inch Hg in 60 seconds for 4 ft. diameter manhole, 75 seconds for 5 ft. diameter manhole, or 90 seconds for 6 ft. diameter manhole.
- C. Grouting repairs will be allowed on the exterior walls of the manhole only.
- D. Manholes which fail any of the tests specified herein shall be repaired by a method approved in advance by the City Engineer, or replaced, and re-tested until acceptable results are obtained. Correct all visible leaks regardless of test results.

END OF SECTION