

SECTION 33 39 00

SANITARY SEWER STRUCTURES

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes
 - 1. Sanitary sewer manholes and miscellaneous appurtenances.
- B. Related Sections
 - 1. Section 02 41 13 - Selective Site Demolition.
 - 2. Section 33 05 05 - Trenching and Backfilling.
 - 3. Section 33 05 17 - Adjust Miscellaneous Structures.
 - 4. Section 33 08 30 - Commissioning of Sanitary Sewer Utilities.
 - 5. Section 33 31 00 - Sanitary Utility Sewer Piping.

1.02 PRICE AND PAYMENT PROCEDURES

- A. Measurement and Payment
 - 1. Refer to Section 33 31 00 for gravity sewer pipe pay items.
 - 2. Sanitary Sewer Manhole: The standard manholes and drop manholes shall be paid for at the contract unit price which shall include the cost of furnishing all pipe, tees, horseshoes, precast selections, sewer block, concrete slabs, adjusting rings, mortar, castings, temporary covers, water proofing, jointing and other material and of delivering, handling, excavating, sheeting, backfilling, dewatering, restoring of the surface and all material or work necessary to install the units complete in place at the depth specified for the depth of 0-10 feet plus an additional payment at the contract unit price per lineal foot of depth greater than ten feet. Manholes shall be measured from the invert of the sewer to the top of the cover.
 - 3. Inside/Outside Drop. Measurement shall be on the basis of lineal and shall be considered to include all labor, materials, and equipment necessary to perform the Work.
 - 4. Piling Foundation for Manholes: will be paid at the unit price bid and shall include steel reinforcement of the base, together with four twenty foot piles each. Piling over twenty feet in length will be paid for at the contract unit price per linear foot for each foot of length over twenty feet driven in place below cut-off.
 - 5. All other Work and costs of this Section shall be incidental to the Project and included in the Total Base Bid.

1.03 SUBMITTALS

- A. Submit Product Data for the following items consistent with Section 01 33 00:
 - 1. Gaskets.
 - 2. Joint sealants.
 - 3. Manufacturers recommended installation procedures for jointing.
 - 4. Manufacturers recommended installation procedures for inside drop.
 - 5. Manhole/Catch Basin Elevation Report
 - a. The Contractor shall complete the report attached to the end of this Section for each structure as it is constructed. The completed report shall be submitted daily to the Engineer or the Engineer's designated representative at some mutually agreeable time. The report shall include all connected pipes to the structure.

- B. Submit shop drawings for the following items consistent with Section 01 33 00:
 - 1. Manholes, including reinforcing, joints, pipe connections, and castings.
 - 2. Shop drawings shall indicate complete information for fabrication and installation of units. Include the following:
 - a. Plans and elevations locating and defining all material furnished by manufacturers.
 - b. Sections and details showing connections, cast-in items, field installed lifting devices, capacities, all openings, and their relation to the structure.

1.04 QUALITY ASSURANCE

- A. The quality of all materials, the process of manufacture, and the finished sections shall be subject to inspection and approval by the Engineer or other representative of the Owner. Such inspection may be made at the place of manufacture or on the Work after delivery, or at both places and the materials shall be subject to rejection at any time on account of failure to meet any of the requirements specified herein. Material rejected after delivery to the Site shall be marked for identification and shall be removed from the Site at once. All materials which have been damaged after delivery will be rejected and if already installed shall be removed and replaced entirely at the Contractor's expense.
- B. At the time of inspection, the materials will be carefully examined for compliance with the appropriate ASTM Standard and this Section, and with the approved manufacturer's drawings. All precast manhole sections shall be inspected for general appearance, dimension, "scratch-strength," blisters, cracks, roughness, soundness, etc. The surface shall be dense and close-textured.
- C. Manhole Design
 - 1. It is the Contractor's responsibility to have the manhole sections, and top and bottom slabs designed and the detailed drawings prepared by a Professional Engineer, experienced in precast concrete manhole design, who is registered in the Project's State.
- D. In Plant Certification of Manholes and Manhole Joints for Water Tightness
 - 1. All manholes used on this Project shall be tested according to the following procedures and meet or exceed the specified requirements. All procedures are located in the American Concrete Pipe Association Cast Plant Certification Manual v3.0 (www.concrete-pipe.org/qcast.htm) in the referenced sections.
 - 2. Vacuum test according to Section IV, Appendix A using the test requirements for the leakage rate of 0.003 CFM per square foot of internal surface area
 - a. All sections and monolithic bottoms shall be tested. Eccentric cones are exempt from testing.
 - b. Mark passing tested sections with VT P (P for passing) and section ID corresponding to testing report.
 - c. Manholes delivered to the Site without testing and positive marking will be **rejected** or its Bid Unit Price reduced 15 percent at the discretion of the Engineer. The foregoing Bid Unit Price reduction is cumulative to any and all other reductions available, including the reduction under Section 3 below.
 - d. Vacuum test results shall be submitted within 2 weeks of product delivery. Payment for product will be withheld until receipt of test results.
 - 3. Pipe spigot inspection 100 percent according to Section IV, Appendix A
 - a. Mark passing tested section with GNGP for passing.
 - b. Manholes delivered to the Site without testing and positive marking will be rejected or its Bid Unit Price reduced 5 percent at the discretion of the Owner. The foregoing Bid Unit Price reduction is cumulative to any and all other reductions available, including the reduction under Section 2 above.
 - c.

PART 2 PRODUCTS

2.01 COMPONENTS

A. Manholes

1. Manholes shall be constructed using precast sections conforming to ASTM Specifications C-478 and have a minimum inside diameter of 48" or as specified in the contract documents.
 - a. Manhole section joints shall be Type R-4 Rubber Gaskets.
 - b. No speed crete will be allowed for manhole sealing.
 - c. Sanitary sewer manholes shall be supplied with pre-formed inverts and flexible sleeve connections for all laterals.
 - d. All inverts shall have 0.10 foot of fall across the manhole unless otherwise stated in the plans and specifications.
 - e. The flexible connection shall be an Interpace Boot as manufactured by Elk River Concrete, or Kore-N-Seal Boot as manufactured by Hanson Concrete or equal.
 - 1) The flexible connection is shown on the attached standard plate.
 - f. Joints shall be waterproofed on the exterior of the manhole with a mastic material approved by the Engineer.
2. Where shown on the Detail Plates or Drawings, manholes may be built using blocks laid up on full mortar beds and vertical joints shall be completely filled with mortar. The base of the unit shall be shaped to form a smooth transition section from inlet to outlet either formed directly in the concrete or built up of brickwork and mortar or by running a half section of pipe through the manhole.

B. MANHOLE FRAMES AND COVERS

1. Cast iron for manhole frames and covers shall be of the best grade of cast iron, free from all injurious defects and flaws, and shall conform to the following Specifications: Federal AA-1-652 ASTM A48-56, A.A.S.H.O. M105-49 and ASA 6.25101948.
2. The standard manhole casting shall be Neenah Foundry No. R1642-B, or equal, as shown on the Standard Plate and shall have two concealed pick holes. The minimum allowable weight shall be 360 pounds.
3. Lettering on the manhole castings shall be as shown on the Standard Plate.
4. All castings shall conform to the requirements and dimensions shown on the drawings. All covers must fit closely in the rings in any and all positions and, when placed in the rings, must fit the ring solidly in all positions so that there will be no rocking from pressure on any point of the cover.

C. Steps

1. Manhole steps shall be in accordance with the Standard Plate for Manhole Steps and shall be spaced 16" on centers, on the downstream face of the manhole, unless specified otherwise.
2. All Sanitary Manholes shall have all steps turned 1/8th of a turn clockwise from the downstream invert.
3. Vinyl or rubber coated cast iron manhole steps shall be manufactured from hi-test metal having a minimum tensile strength 35,000 pounds per square inch.
4. All manhole steps shall be Neenah Foundry Step No. R-1981J, Badger F-15 or equal.

D. Mortar

1. Mortar shall consist of a mixture of one part Portland Hydraulic Cement and two parts of clean washed sand by volume.
2. The quantity of Mortar in the mixture shall be sufficient to produce a stiff workable mortar, but in no case shall exceed five and one-half (5 1/2) gallons of water per sack of cement.
3. Sand shall conform to ASTM C-144.
4. Portland Cement shall conform to ASTM C-150.

E. CONCRETE

1. Concrete to be used shall be composed of a mixture of fine and coarse aggregate and a Portland Hydraulic Cement conforming to the ASTM Specification Designation C-150, Type 1, with the proper water-cement ratio to obtain a concrete testing not less than 3,000 pounds per square inch in 28 days.
2. The fine aggregate for concrete shall be composed of a clean washed sand of hard, sharp, durable particles.
3. Coarse aggregate for concrete shall be composed of a gravel uniformly graded 3/4 inch maximum size to #4 sieve.
4. Coarse aggregate shall be composed of hard durable particles free of shale, chert, flat or elongated pieces.
5. Mixing water shall be suitable for drinking purposes, containing no acids, alkalis, oils or other deleterious materials.
6. Concrete shall be mixed in a mechanically operated mixer so controlled that the drum shall operate a minute and one-half after all materials including water are in the drum.

F. STEEL REINFORCING BARS

1. Steel reinforcing bars shall be deformed steel bars with approved casting for concrete reinforcement in conformance with ASTM Designation A-305 and ASTM Designation A-15 Intermediate Grade Billet Steel.

PART 3 EXECUTION

3.01 MANHOLE INSTALLATION

- A. Excavation and Preparation of Trench: Conform to Section 33 05 05.
- B. Manholes and catchbasins shall be set and jointed to the line in the manner specified for laying and jointing pipe.

3.02 LOCATION

- A. Manholes and clean-outs shall be located as shown on the plan or as directed by the Engineer and all changes in direction, changes in pipe size, dead ends, or every 400 feet.

3.03 TYPE OF CONSTRUCTION

- A. Wherever possible, and unless otherwise specified, the manholes and catchbasins shall be constructed of precast sections.
- B. Where standard sections cannot be used, sections may be constructed of block concrete.
- C. Unless otherwise specified, the manholes and catchbasins if necessary shall be constructed with steps in accordance with the Standard Plate of this Specification.

3.04 CONSTRUCTION DETAILS

- A. The details of construction of each individual structure shall conform to the drawings and specifications as designated.
- B. Frames and covers shall be set to the designated elevation in a full mortar bed.

- C. The bottom of all manholes shall be constructed of half section of equivalent size pipe shaped to conform to the inlet and outlet pipe so as to allow a free, uninterrupted flow.
- D. All inverts shall have a 0.10 foot drop across the manhole unless otherwise stated in the plans and specifications.
- E. Any manhole invert not within 0.04 feet of the specified 0.10 foot drop shall be rejected.

3.05 ADJUSTING RINGS AND BLOCKS

- A. A minimum of two (2) and a maximum of four (4) adjusting rings shall be provided between the cast iron frame and the top concrete manhole section.
- B. The rings shall provide between 4" and 12" of adjustment. Adjusting rings shall be 2", 4", or 6" and be implemented so the fewest number of rings are used.

3.06 WATERPROOFING AND PRECAST SECTION JOINT CONSTRUCTION

- A. Manholes and catchbasins shall be constructed in such a manner that they are waterproof.
- B. Joints between manhole sections shall be made using confined O-ring rubber gaskets as specified previously.

3.07 LIFTING HOLES

- A. Not more than two (2) lifting holes will be allowed in any precast manhole section.
- B. All lifting holes shall be plugged with non-shrinking grout to ensure a waterproof installation.

3.08 MANHOLE BASES

- A. The concrete base shall be of size and depth as shown on the drawings.
- B. Concrete used shall have a 28-day compressive strength of at least 3,000 pounds per square inch.
- C. Precast concrete bases shall be used unless prior written approval by the Engineer allows poured bases.
- D. Precast bases must be placed on a minimum of six inches of granular material which has been thoroughly compacted and leveled off across the entire width of the base.
- E. Where the foundation is unstable, the Engineer may order the Contractor to install manholes on piling.
- F. Manhole base reinforcement and timber piles shall be as shown on the drawings.

3.09 MANHOLE CASTINGS

- A. Manhole castings for sanitary sewer manholes shall have temporary watertight structure covers.
- B. The temporary watertight structure covers shall remain covered until just prior to the placement of the final wearing course of bituminous asphalt.

3.10 MANHOLE DROP SECTIONS

- A. Manhole drop sections shall be constructed where shown on the plans according to the Detail Drawings.
- B. Pipes shall be installed to match flow lines unless an outside drop is constructed. Inside drops shall only be allowed with written approval from the Engineer.
- C. Inside drops shall be manufactured by Reliner/Duran Inc. or approved equal.

3.11 CLEAN-OUTS

- A. Clean-outs shall conform to the design shown in the Standard Plates.
- B. Clean-outs are required every 100 feet on services and at all dead ends where no manhole is present.
- C. A steel fence post shall be placed flush with the top of the cleanout cap on all exterior cleanouts to aid in locating these structures in the future.
- D. A metal cover shall be required for all clean outs placed on main line sewers.

END OF SECTION

