

SECTION 2237 - MANHOLES

PART 1 - GENERAL

1.1 SCOPE OF WORK:

Provide all labor, materials, equipment and services required to furnish and install all manholes and appurtenances shown on the drawings and/or specified herein.

1.2 SUBMITTALS:

- A. Descriptive literature, catalog cuts, and dimensional prints clearly indicating all dimensions and materials of construction, shall be submitted on all items specified herein to the ENGINEER for review before ordering. Comply with provisions of Section 1010.
- B. At the time of submission, the CONTRACTOR shall, in writing, call ENGINEER's attention to any deviations that the submittals may have from the requirements of the ENGINEER's Contract drawings and specifications.

PART 2 - PRODUCTS

2.1 MANHOLES:

Manholes of the form and dimensions shown on the drawings shall be constructed of ASTM C 478 precast reinforced concrete manhole sections erected on 4,000-psi one-piece precast concrete integral foundation/bases. Cast-in-place sections and foundations are subject to the OWNER'S review. The excavation shall be kept free of water while the manhole is being constructed and the manhole shall not be backfilled until inspected by the ENGINEER.

A. Standard Manholes:

Standard manholes shall be six feet to twenty-five feet in depth, measured from the top of the cover frame to the invert of the outlet. The top section shall be an eccentric cone type as shown on the drawings.

B. Manholes with Slab Tops (Shallow Manholes):

The shallow manholes shall be less than six (6) feet in depth, measured from the top of the cover frame to the invert of the outlet. The top section shall be a flat top style as shown on the drawings.

C. Concrete Manhole Sections:

Precast concrete manhole sections (barrels/risers) shall conform to ASTM C 478.

D. Precast Concrete Eccentric Cones:

Precast concrete eccentric cones shall be of the size and shape shown on the drawings and shall conform to ASTM C 478.

E. Precast Manhole Section Joints:

Precast manhole section joints shall be formed entirely of concrete employing a round, wedge shaped profile gasket, Press Seal Type TP or equal, and, when assembled, shall be self-centering and make a uniform watertight joint conforming to ASTM C 443. The joint shall also be sealed with a bituminous mastic joint sealing compound such as Concrete Sealants, Inc. "Con Seal", or equal.

F. Manhole Bottom Sections:

Manhole bottom sections shall be precast concrete conforming to ASTM C478 or cast-in-place

according to the detail drawings.

G. Manhole Steps:

1. Plastic Steps - Plastic manhole steps shall be press fit steps made of polypropylene plastic over 2" steel reinforcing. Manhole steps shall be PS1-PF manufactured by MA Industries, Peachtree City, Georgia; ML-10 manufactured by American Step Company, Inc., Griffin, Georgia; or equal. Steps shall be driven into specially sized holes cast or drilled into the manhole section. Cast holes shall be formed in the manhole section using an insert plug which is removed upon curing. Seal or grout must be provided if the step holes protrude completely through the manhole wall.
2. Whenever possible, steps shall not be placed directly above the manhole flow channel. Steps should be located above the largest bench area in the manhole base. Step spacing shall be 12" minimum and 16" maximum. Steps shall be equally spaced, the entire depth of the manhole.

H. Manhole Frames and Covers: Manhole frames and covers shall be gray iron casting of the heavy duty pattern with four vent holes. The cover and seat shall have machined bearing surfaces to prevent rocking and rattling and a concealed pick hole. Tops of covers shall be flush with ring edge of frames. Covers shall have the word "WATER" cast on them in large letters.

1. Standard Manhole Frames and Covers: Standard manhole frames and covers shall be Neenah R-1767, East Jordan 1600, or equal, unless otherwise specified or indicated on the plans.
2. Manhole Frames Above Grade: Where manhole covers are above finished grade or where shown on the plans, manhole frames shall be bolted down through the anchor base flange to the cone section with four 7/8" x 9" stainless steel anchor bolts.
3. Locking Manhole Frames: Where shown on the plans or required by the ENGINEER (typically in areas with a high potential for vandalism such as within off-highway easements), Neenah R-1926-B with Type J-"T" Handle Bar Lock, East Jordan 2045 with Type 5 "T" Handle Bar Lock, or equal, manhole covers shall be used and shall be bolted down through the anchor base flange to the cone section with four 7/8" x 9" stainless steel anchor bolts.

I. Manhole Grade Adjustment Rings:

All grade adjustments of manhole frame and cover assemblies shall be completed utilizing reinforced concrete grade rings or injection molded High Density Polyethylene (HDPE) adjustment rings as manufactured by Ladtech, Inc. or approved equal. Each new manhole shall have a total height of adjustment rings between 8 and 18 inches, unless otherwise directed by the ENGINEER.

1. Reinforced Concrete Grade Adjustment Rings:
 1. Precast reinforced concrete grade adjustment rings shall conform to ASTM C 478 and shall be free from cracks, voids, and other defects.
 2. The adjustment rings shall be tested to assure compliance with impact and loading requirements per AASHTO's Standard Specification for Highway Bridges.
 3. Installation shall be according to manufacturer's recommendations and the following procedure.
 1. Clean the concrete cone or top slab with a whisk broom or chisel to assure a flat seating surface free of rocks, gravel, blacktop, protruding concrete, frozen or other debris.
 2. Measure the distance from the cone or top slab to the projected finish grade and deduct for the cover frame. Determine the net buildup of rings

- necessary to come within 1/4" of grade with the cover frame in place.
3. Determine the best ring height combination to attain necessary adjustment.
 4. Use mortar to create a flat sealable surface if the cone or top slab is too badly chipped or damaged to attain a good seal. Apply two strips of Conseal or approved equal to the cone or top slab around the entire circumference, overlapping the ends.
 5. Place the first ring down onto the cone or top slab.
 6. Apply two strips of Conseal or approved equal to the top of the first grade ring around the entire circumference, overlapping the ends.
 7. Place the second ring down onto the first ring.
 8. Continue the assembly per steps 6 and 7 for each adjustment ring being used. A maximum height of 18" is permitted for adjustment rings.
 9. Prior to setting the cover frame in place, apply two strips of Conseal or approved equal to the last ring around the entire circumference, overlapping the ends.
 10. Set the cover frame in place, centered on the top ring.

2. High Density Polyethylene Grade Adjustment Rings:

1. Plastic adjustment rings shall be manufactured from polyethylene plastic as identified in ASTM D 1248 (Standard Specification for Polyethylene Plastic Molding and Extrusion Materials). Material properties shall be tested and qualified for usage per the ASTM Test Methods reference in ASTM D 1248. Recycled material meeting the above requirement may be used.
2. Plastic adjustment rings shall be manufactured utilizing the injection molding process as defined by the Society of Plastic Engineers (SPE).
3. The adjustment rings shall be tested to assure compliance with impact and loading requirements per AASHTO's Standard Specification for Highway Bridges.
4. Installation shall be according to manufacturer's recommendations and the following procedure.
 1. Clean the concrete cone or top slab with a whisk broom or chisel to assure a flat seating surface free of rocks, gravel, blacktop, protruding concrete, frozen or other debris.
 2. Measure the distance from the cone or top slab to the projected finish grade and deduct for the cover frame. Determine the net buildup of rings necessary to come within 1/4" of grade with the cover frame in place.
 3. Determine the best ring height combination to attain necessary adjustment. Molded slope rings shall be used to match grades of paved surfaces that are not flat. Molded slope rings shall be used to accommodate other grades that are not flat only when directed by the ENGINEER.
 4. Dry stack rings on cone. Index any slope rings as necessary. Place cover frame casting on top of the assembly and verify height and slope match.
 5. Mark the entire stack with a vertical line and disassemble.
 6. Use mortar to create a flat sealable surface if the cone or top slab is too badly chipped or damaged to attain a good seal. Apply a 3/16 to 1/4 inch bead of approved butyl sealant to the cone or top slab (A double bead of sealant should be used if surface irregularities are present).
 7. Place the first ring down onto the cone or top slab with the male lip into the opening, aligning the vertical line.
 8. Apply a 3/16 to 1/4 inch bead of approved butyl sealant on the bottom of the next ring, as close to the male lip as possible around the entire 360 degrees of the ring.
 9. Place the second ring down onto the first ring with the male lip interlocking into the center, aligning the vertical line.
 10. Continue the assembly per steps 8 and 9 for each adjustment ring being

used. A maximum height of 18" is permitted for adjustment rings.

11. Prior to setting the cover frame in place, apply a 3/16 to 1/4 inch bead of approved butyl sealant on top of the last ring. Apply the sealant in a location to contact the cover frame the full 360 degrees.
 12. Set the cover frame in place, centered on the top ring.
5. All HDPE adjustment rings shall be covered by a full two-year warranty that warrants the adjustment rings for two years from the date of installation against defects in materials. Any defective adjustment rings shall be replaced at no cost to the OWNER.

10. Pipe Connections Into Manholes:

Typically, arch cutouts shall be provided in the manholes for the pipe to pass through. Where required on the plans, pipe openings in manholes shall be flexible and watertight. Pipe shall be sealed in the manhole section pipe openings with a resilient connector meeting the requirements of ASTM C923. The connection may be any of the following types:

1. Rubber sleeve with stainless steel banding
 - a. KOR-N-SEAL as manufactured by Pollution Control Systems, Inc.
 - b. Lock Joint Flexible Manhole Sleeve as manufactured by Interspace Corporation
 - c. Or Equal
2. Rubber gasket compression
 - a. Press Wedge II as manufactured by Press-Seal Gasket Corporation
 - b. Dura-Seal as manufactured by Dura Tech, Inc.
 - c. Or Equal

Resilient connector shall be cast integrally into the wall of the manhole section at time of manufacture, or, shall be installed by mechanical means in openings cut into manhole wall per ASTM C 923.

No mortar shall be placed around the connector on the inside or outside of the manhole unless directed by the ENGINEER.

- K. If required on the plans, manholes shall be completely sealed and watertight (except covers that are not required to be watertight). All visible leaks in manholes observed during construction, inspection, or testing shall be repaired. If the OWNER chooses to perform a vacuum test, the CONTRACTOR shall be responsible for making any necessary repairs to achieve a satisfactory vacuum test.
12. Bedding and backfill for manholes shall be in accordance with Section 2560 of these specifications as required for pipe larger than 16" nominal diameter.

PART 3 - BASIS OF PAYMENT

Payment for manholes and covers will be included in the unit price for Air Valve Installation or Valve in Accessible Manhole, as applicable. Such price will include the manhole, complete with bedding, precast concrete base riser and cone (or flat slab top), sections, adjusting rings, cast iron frame and cover, steps, excavation (including rock), backfilling and surface restoration (except pavement replacement).

END OF SECTION