

SECTION 01000

MANHOLES, DROP CONNECTIONS, AND CONFLICT MANHOLES

PART I - GENERAL

1.0 APPLICABLE STANDARDS

- 1.1 All products, installation and testing of force mains and gravity sewers shall meet the requirements of Regulation 61-67, Standards for Wastewater Facility Construction or State Primary Drinking Water Regulations (R61-58).
- 1.2 All products, installation and testing of force mains and gravity sewers shall meet the requirements of "Recommended Standards for Wastewater Facilities" (Ten State Standards), latest edition.
- 1.3 Any reference to SCDOT standard specifications was obtained from "Standard Specifications for Highway Construction" published by the South Carolina Department of Transportation. Unless otherwise noted, the most current date published applies.

PART II - MATERIALS

2.0 **MATERIALS:** All materials for sewer pipe shall be new and shall be furnished in accordance with the following:

- 2.1 Manholes: Shall be precast reinforced concrete sections conforming to ASTM C-478 and to the following:
 - 2.1.1 Tops shall be eccentric cone where cover permits unless shown otherwise on the drawings and flat slab tops otherwise. Bottoms shall be integrally cast unless the Contractor proposes to use specialty bases ("Dog-House") at points of connection to existing sewer mains. Any special bases or riser used must be detailed in shop drawings and submitted for approval. Manhole wall and base dimensions shall conform to C-478 or to the minimum dimensions shown on the approved drawings.
 - 2.1.2 Manhole supplier shall design manhole sections to resist earth loads and to resist uplift resulting from buoyant forces calculated with ground water table at the ground surface. Wall and/or base dimensions shall be increased accordingly.
 - 2.1.3 Pipe connection shall consist of an approved continuous boot of 3/8 inch minimum thickness neoprene as shown on the drawings conforming to ASTM C-923. Boots shall be either cast into the manhole wall or installed into a cored opening using internal compression rings. Installed boot shall result in a water-tight connection meeting the performance requirements of ASTM C-443.
- 2.2 Frames and Covers: Shall be of domestic manufacture good quality cast iron of uniform grain, conforming to ASTM A48, Class 30 or better, constructed in accordance with details shown herein.

- 2.3 Aluminum steps shall be of aluminum alloy 6061T6. Composite plastic-steel steps shall consist of a 1/2 inch deformed steel reinforcing rod encapsulated in a co-polymer polypropylene plastic; reinforcing rods shall conform to ASTM A615, Grade 60, and polypropylene plastic shall conform to ASTM D2146, Type 11, Grade 10906. Minimum design live load of steps shall be a single concentrated load of 300 pounds. Steps shall be nine (9) inches in depth and at least twelve (12) inches in width. Steps shall have non-skid top surfaces. All parts of aluminum steps top be embedded in concrete or masonry shall be coated with bituminous paint or zinc chromate primer.
- 2.3.1 Steps shall be uniformly spaced not more than sixteen inches (16") on center, including the spacing between the top stop and the manhole cover. Steps shall be embedded in the wall a minimum distance of 4 inches in either cast or drilled holes. Steps shall not be driven or vibrated into fresh concrete and shall withstand a pullout resistance of 2000 lbs. when tested in accordance with ASTM C 497. Each step shall project a minimum of 5 inches from the wall measured from the point of embedment.
- 2.4 Concrete (poured in place): Air entrained Portland Cement Concrete having a minimum of twenty-eight (28) day compressive strength of 3,000 psi.
- 2.5 Joint Sealant: Butyl Rubber based conforming to AASHTO M-198, type B – butyl rubber, suitable for application temperatures between 10 and 100 degrees F.
- 2.6 O-Ring or Gasket (Contractor's Option): ASTM C-443.
- 2.7 Sand Cement:
- 2.7.1 Portland Cement: ASTM C50, Type I.
- 2.7.2 Sand: Clear, sharp, graded from fine to course, ASTM C-144.
- 2.7.3 Water: Clean and potable.
- 2.7.4 Mixture: One (1) part cement, two (2) parts sand.
- 2.8 Pipe and Fittings: Same as sewer pipe.
- 2.9 Precast Grade Rings: Shall be no less than 4" in height and conform to ASTM C478.
- 2.10 Washed Stone: Stone material, crushed stone or gravel shall be strong, durable, and conform to standard size No. 57 as per SCDOT Section 800.

PART III - EXECUTION

- 3.1 Excavation for all sanitary sewer manholes shall be carried to a depth such as to provide a minimum of 6 inches of washed stone bedding material below the bottom of structures and extend to a minimum of 8 inches beyond each side of structures.
- 3.2 Should unstable soil, organic soil, or soil types classified as fine-grained soils (silts and clays) by ASTM D-2487 be encountered at the bottom of excavations, such soils shall be removed to a depth and width determined by the Engineer, and approved by the Commission, and properly disposed of. The resulting

undercut shall be backfilled with washed stone, Placement and compaction shall conform to applicable excavation specifications (section 01500).

- 3.3 Manholes shall be constructed of precast reinforced concrete with cast iron frames and covers in accordance with details shown herein.
- 3.4 Invert channels shall be smooth and accurately shaped to semi-circular bottom conforming to the inside of the adjacent sewer sections. Inverts shall be formed of concrete, and no laying pipe through manholes will be permitted. Changes in size and grade shall be made gradually and evenly. The minimum bending radius of the trough centerline shall be 1.5 times the pipe I.D.. A minimum 6" radius shall be provided at the intersection of 2 or more channels. Excluding service connections, connections of sewer lines at manholes shall be constructed such that the internal angle of deflection is equal or greater than ninety (90) degrees.
 - 3.4.1 Depressions, high spots, voids, chips or fractures over 1/4" in diameter or depth shall be filled with sand cement and finished to a texture reasonable consistent with that of the formed surface.
- 3.5 Precast concrete bottom sections, risers, and top sections shall be fabricated such that when assembled, they provide a manhole conforming to the depth required. No manhole assembly will be accepted that will allow surface water inflow to occur through the cover due to poor attention to construction grades.
- 3.6 Sections are to be assembled so as to provide a plumb structure with uniform bearing at all joints and at the base slab. Joints shall be thoroughly cleaned to remove dirt and foreign material. The butyl rope sealant shall be unrolled directly against the base of the spigot. Leave the protective paper in place until the sealant is fully in place. Overlay rope from side to side, not top to bottom. Joints to be plastered smooth inside and outside of manhole with a cement grout. Joints shall be water tight.
- 3.7 Pipes shall project into the manhole 2-inches and shall be mechanically sealed with a molded neoprene boot.
- 3.8 Manhole frames and covers shall be set flush in paved areas with the finished grade or as other wise shown on the approved plans. Precast adjustment (grade) rings shall be used as required. No more than 8 vertical inches of grade ring will be allowed per manhole. Seal frame to adjustment ring, or cone section with butyl sealing rope and completely grout the ring to the top manhole section. The top elevation of all manholes shall be above the 50-year flood plain, or have watertight manhole covers as shown on the approved drawings. Top elevations of the ring and cover in road shoulders shall be three (3) inches above finish grade. In dedicated easements, the top elevation of the ring and cover shall be six (6) inches above adjacent grade.
- 3.9 Drop connections shall be constructed in accordance with details shown herein.
- 3.10 Conflict Manholes and Manhole Alternates shall be constructed in accordance with details shown herein.

END OF SECTION