



## SECTION 33 05 13

### MANHOLES

#### PART 1 GENERAL

##### 1.01 SECTION INCLUDES

- A. CONTRACTOR shall furnish and install precast concrete manhole base, sections, adjusting rings, steps, and manhole ring and cover, complete.

##### 1.02 RELATED SECTIONS

- A. The following is a list of SPECIFICATIONS which may be related to this section:
  - 1. Section 01 57 19, Temporary Environmental Controls
  - 2. Section 07 91 00, Manhole Preformed Joint Seals.
  - 3. Section 31 23 00, Excavation and Fill.
  - 4. Section 31 23 19, Dewatering.
  - 5. Section 31 23 33, Trenching and Backfilling.
  - 6. Section 31 25 00, Erosion and Sedimentation Controls

##### 1.03 REFERENCES

- A. The following is a list of standards which may be referenced in this section:
  - 1. ASTM International (ASTM):
    - a. A48/A48M, Standard Specification for Gray Iron Castings.
    - b. C150, Standard Specification for Portland Cement.
    - c. C478, Standard Specification for Precast Reinforced Concrete Manhole Sections.

##### 1.04 SUBMITTALS

- A. CONTRACTOR shall submit manufacturer's technical descriptions of manhole sections, steps, rings, and covers.
- B. CONTRACTOR shall submit repair materials and methods to ENGINEER for review and approval.
- C. Material and procedures to be used in structure abandonment shall be approved by ENGINEER.



## **PART 2 PRODUCTS**

### **2.01 MATERIALS**

#### **A. Precast Manhole Sections:**

1. Precast reinforced concrete manhole top sections shall be produced using Type II Portland cement, or as approved by ENGINEER, and be fabricated in accordance with ASTM C478.
2. Flexible plastic sealant, RAM-NEK, or equivalent, shall be required for all horizontal mating surfaces between precast top sections and precast slab tops of meter vaults.
3. Manhole sections shall be clearly marked with the information specified for product marking in ASTM C478.
4. Imperfections in the precast concrete manhole base or sections shall be reviewed by ENGINEER prior to repair.

#### **B. Manhole Frames and Covers:**

1. Manhole frames and covers shall be three hundred and thirty-eight (338) pounds or greater, twenty-four-inch (24") inside diameter, as manufactured by D & L, Model A-1161 with closed pick hole or approved equal.
2. Frost proof covers if required shall be D & L, Model A-1019 with closed pick hole or approved equal. The ring and cover shall conform to ASTM A48/A48M Class 35B.
3. Watertight frames and covers if required shall be NEENAH R-1915/R-1916 Series (as applicable) or approved equal.

#### **C. Manhole Steps:**

1. Manhole steps shall be polypropylene and be cast into the manhole wall at the same time the manhole section is cast.
2. The manhole steps shall be approximately nine (9) inches wide and thirteen (13) inches long and weigh approximately two (2) pounds.
3. The steps shall be located no more than twenty eight (28) inches from the top of the finished manhole nor more than eighteen (18) inches from the floor and be spaced no greater than twelve (12) inches apart.
4. The step shall have a skid-resistant surface and be designed mechanically to prevent sideslip.

#### **D. Joints: All precast concrete joints shall be made with a preformed joint sealer or grout. All joints that are made with the joint sealer shall also be pointed with mortar on the inside of the section.**

1. Mortar:



- a. Mortar used in jointing precast concrete manhole sections shall be composed of one (1) part Portland cement and not more than three (3) nor less than two (2) parts of fine aggregate. Portland cement shall meet the requirements of ASTM C150, Type II. Hydrated lime or masonry cement shall not be used.
  - b. Fine aggregate shall consist of well-graded natural sand having clean, hard, durable, uncoated grains, free from organic matter, soft or flaky fragments or other deleterious substances such as calcium chloride. The fine aggregate shall be thoroughly washed and shall be uniformly graded from coarse to fine with a minimum of ninety five percent (95%) passing the #4 sieve and a maximum of seven percent (7%) passing the #100 sieve.
  - c. All mortar shall be fresh for the WORK at hand. Mortar that has begun to set shall not be used.
2. Joint Seals: Precast concrete manhole section joint seals shall meet the requirements of Section 07 91 00, Manhole Preformed Joint Seals.

### **PART 3 EXECUTION**

#### **3.01 GENERAL**

- A. The manhole shall be constructed on a properly compacted subgrade and in such a manner that the center of the manhole coincides with the intersection of the projected centerlines of the inlet and discharge pipelines. The surface shall be level to permit proper construction of the riser sections.
- B. Changes in size and grade of channels for gravity pipelines shall be made gradually and evenly using concrete made with ASTM C150, Type II Portland cement. The invert channels may be formed directly in the concrete manhole base or may be constructed by laying sewer pipe through the manhole and cutting out the top half (1/2) of the pipe after the concrete has cured and reached design strength. The floor of the manhole outside of the channels shall slope upward from the springline of the pipeline to the wall of the manhole at not less than one (1) inch per foot nor more than two (2) inches per foot.

#### **3.02 INSTALLATION**

- A. Placement of Precast Concrete Base and Riser Sections:
  1. Sections: Set the base and each manhole riser section such that the manhole will be plumb. Use sections of various heights to bring the ring and cover to the proper grade. The last riser section prior to placement of an eccentric cone or flat top shall be the shortest available but in no case greater than twenty four (24) inches in height.
  2. Joints: Sections shall be clean and dry. Mortar joints shall not be used when temperature of the air or section will be below thirty five degrees Fahrenheit (35°F) when placing and curing, unless supplemental heat is used to keep the sections warm and mortar from freezing.



- a. Using Joint Sealer: The mating surfaces of the two sections to be joined shall be thoroughly cleaned. Apply the joint sealer to the seat of the base or riser section that is already in place. Only one joint is permitted in the sealer. Carefully lower the second precast concrete section onto the first section so that the joint sealer compresses forming a uniform seal. Each succeeding precast section shall be jointed in a similar manner.
- b. Using Mortar: The mating surfaces of the two (2) sections to be joined shall be thoroughly cleaned. Apply a one-inch (1") minimum bed of freshly mixed mortar to the joint of the section already in place. The mortar shall be uniform in thickness and cover the entire perimeter of the section. Carefully lower the second precast concrete section onto the first section so that the mortar compresses forming a uniform seal. Tool the mortar for a uniform appearing joint. Each succeeding precast section shall be jointed in a similar manner.

3. Lifting Holes: Fill all lifting holes with mortar.

**B. Adjusting Rings, Ring, and Cover Installation:**

1. Install ring and cover on one or maximum of two precast concrete adjusting rings.
2. Each adjusting ring shall be a maximum of eight (8) inches high.
3. Adjusting rings shall be placed similar to the precast concrete manhole rings (thoroughly cleaned and placed with mortar or joint sealer).
4. The total allowable height of adjusting rings, ring, and cover shall be one (1) inch less than the manufacturer's shortest precast concrete riser section.
5. Unless otherwise indicated in the DRAWINGS, set the top of the adjusting rings such that no part of the cast iron ring and cover will project above a point one-quarter inch (1/4") below the finish surface of pavement.

**C. Pipe Connections:**

1. The manhole shall be thoroughly bonded to the barrel of the pipe and all connections with pipe shall be made without projections or voids.
2. All pipes shall have a Hamilton Kent or approved equal waterstop gasket applied around the pipe.
3. The joint between the PVC pipe and manhole wall shall be sealed with a non-shrink grout.

**3.03 FIELD QUALITY CONTROL**

- A. Each manhole shall be watertight from infiltration and exfiltration of water.
- B. CONTRACTOR shall inspect and repair all visible leaks and damp spots.



- C. When required by ENGINEER, manholes shall be pressure tested by filling with water to the level of the top of the top riser to determine watertightness. There shall be no measurable loss of water in a one-hour (1 hr.) time period.

#### 3.04 ABANDONMENT

- A. Manholes to be abandoned in place shall have all pipes entering or exiting the structure plugged with lean concrete or controlled low strength material backfill (Flo-Fill). For manholes with existing pipes too large to plug with fill, CONTRACTOR shall construct a bulkhead on the inside of the manhole to prevent the fill from entering the pipes.
- B. Manhole tops or cone section shall be removed to the top of the full barrel diameter section or to a point not less than eighteen (18) inches below final grade. The structure shall then be backfilled with lean concrete or Flo-Fill. Surface restoration shall be completed to match the surrounding areas.
- C. Manhole rings and covers, inlet grates and frames, precast flat top or cone sections, or any other salvageable items shall be salvaged, stored, and delivered to such location as prescribed by ENGINEER.

**END OF SECTION**



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