

**SECTION 33 49 00**  
**STORM DRAINAGE STRUCTURES**

**PART 1 - GENERAL**

**1.1 SECTION INCLUDES**

- A. Pre-cast concrete manhole, drain inlets, and catch basins with inverts to accommodate HDPE and Reinforced Concrete Pipe.
- B. Ductile iron and galvanized steel frames, covers, and grates for manholes, drain inlets, and catch basins.

**1.2 RELATED SECTIONS**

- A. Section 03 30 00 - Cast-In-Place Concrete.
- B. Section 31 20 00 - Earth Moving.
- C. Section 33 41 00 -Storm Utility Drainage Piping.

**1.3 REFERENCES**

- A. ACI 318 - Building Code Requirements for Reinforced Concrete.
- B. ASTM A 536 - Ductile Iron Castings.
- C. ASTM C 55 - Concrete Building.
- D. ASTM C 478 - Precast Reinforced Concrete Manhole Sections.
- E. ASTM C 923 - Resilient Connectors Between Reinforced Concrete Manhole Structures and Pipes.

**1.4 DESIGN REQUIREMENTS**

- A. Equivalent strength shall be based on structural design of reinforced concrete as outlined in ACI 318.
- B. Design of lifting devices for precast structures shall conform to ASTM C 913.
- C. Design of joints for precast structures shall conform to ASTM C 913. Joints shall be designed for leakage not to exceed 0.025 gallon per hour per foot of joint at 3 feet of head.

**1.5 SUBMITTALS**

- A. Shop Drawings: Indicate manhole locations, elevations, piping, and conduit sizes and elevations of penetrations.
- B. Product Data: Submit welded grates, component construction, features, configuration, and dimensions.

**1.6 QUALITY ASSURANCE**

- A. Environmental Agency Compliance: Comply with regulations pertaining to storm drainage systems.

- B. Utility Compliance: Comply with regulations pertaining to storm drainage systems. Include standards of water and other utilities where appropriate.
- C. Product Options: Drawings indicate sizes, profiles, connections, and dimensional requirements of system components and are based on specific manufacturer types indicated. Other manufacturers' products with equal performance characteristics may be considered. Refer to Division 1 Section "Product Substitutions."
- D. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section with minimum three years documented experience.

#### **1.7 DELIVERY, STORAGE AND HANDLING**

- A. Comply with precast concrete manufacturer's instructions for unloading, storing and moving precast manholes and drainage structures.
- B. Store precast concrete manholes and drainage structure to prevent damage to the VA's property or other private property, and any property so damaged shall be repaired at the Contractor's expense.
- C. Clearly mark each precast structure by indentation or waterproof paint to indicate date of manufacture, manufacturer and identifying symbols and or numbers shown on Construction Documents to indicate its intended use. Neatly mark same on inside of structures with 12" high lettering

#### **1.8 ENVIRONMENTAL REQUIREMENTS**

- A. Maintain materials and surrounding air temperature to minimum 50 degrees F prior to, during, and 48 hours after completion go any masonry or grouting work.

### **PART 2 - PRODUCTS**

#### **2.1 CLEAN OUT TO GRADE**

- A. Plastic Pipe (PVC) ASTM D 2729, SDR 35, nominal inside diameter of 6 inch, threaded cleanout adapter and cleanout plug.
- B. Cleanout Box:
  - 1. In landscaped areas: use B.2 below in conjunction with an 18" concrete collar.
  - 2. In finished concrete or paved areas:
    - a. Provide cast iron with threaded adjustable housing, flanged ferrule with round scoriated cast iron tractor type cover suitable for placement in a concrete slab or collar. Size opening to accommodate riser size.

- b. The following manufacturer was used as a basis for the specification and does not imply a proprietary specification:

1) WADE Model 6000Z series by Tyler Pipe/Wade Division Tyler TX

## **2.2 CATCH BASIN, AREA DRAIN, FRAMES AND GRATES**

- A. Precast Catch Basins: Concrete for precast sections shall have a minimum compressive strength of 5,000 psi at 28 days, ASTM A615, Grade 60 reinforcing steel, rated for AASHTO HS20-44 loading with 30 percent impact, and conform to ASTM C-857.
- B. Frame and Cover for Gratings: Frame and cover for gratings shall be cast gray iron conforming to ASTM A48; cast ductile iron conforming to ASTM A536 Weight, shape, size, and waterway openings for grates and curb inlets shall be as indicated on the Construction Documents.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Verify items provided by other Sections of Work are properly sized and located.
- B. Verify that built-in items are in proper location, and ready for roughing into Work.
- C. Verify excavation and location for manholes and drain inlets is correct.
1. Drain inlets shall be placed so the frame and grate line up with front lip of curb and gutter section.

### **3.2 PREPARATION**

- A. Coordinate placement of inlet and outlet pipe required by other Sections.
- B. Do not install structures under site conditions known to result in loads heavier than that for which the structure was designed.
- C. Inspect precast concrete structures immediately prior to placement in the excavation to verify that they are internally clean and free from damage. Remove damaged units from the construction site and replaced, at no additional cost to the VA.

### **3.3 INSTALLATION**

- A. Excavation and Backfill:
1. Excavate for drainage structures in accordance with Section 31 20 00 in the location and to depth shown. Provide clearance around the sidewalls of the structure as required for construction.

2. If groundwater is encountered, prevent accumulation of water in excavations. Place drainage structures in a dry trench.
  3. Where the possibility exists of a watertight structure becoming buoyant in a flooded excavation, take necessary steps to avoid flotation of the structure.
- B. Place base pad, trowel top surface level.
  - C. Place sections plumb and level, trim to correct elevations, anchor to base pad. Install seals at all section joints. Align steps with opening.
  - D. Drainage structures shall be supported at proper grade and alignment on crushed stone bedding or other support system, as shown on Construction Documents.
  - E. Backfill excavations for manholes and drainage structures in accordance with Section 31 20 00.
  - F. Form and place plumb and level, to correct dimensions and elevations. As Work progresses, build fabricated metal items.
  - G. Cut and fit for pipe, conduit, and sleeves.
  - H. Grout base of shaft sections to achieve slope to exit piping. Trowel smooth. Contour as required.
  - I. Set cover frames and covers level without tipping, to correct elevations.
  - J. Coordinate with other Sections of Work to provide correct size, shape, and location.

#### **3.4 PRECAST CONCRETE DRAINAGE STRUCTURE INSTALLATION**

- A. To ensure safety, lift precast structures at the lifting points designated by the manufacturer.
- B. When lowering drainage structures into the excavations and joining pipe to the units, take precautions to ensure that the interior of the pipeline and structure remains clean.
- C. Set precast structures so that they firmly and fully bear on crushed stone bedding, compacted in accordance with the provisions of Section 31 20 00 or on other support system shown on Construction Documents.
- D. Assemble multi-section structures by lowering each section into the excavation. Lower, set level, and firmly position the base section before placing additional sections.
- E. Ensure joint integrity by removing all foreign materials from joint surfaces and verifying that sealing materials are placed properly. Avoid misalignment by using guide devices affixed to the lower section.

- F. Joint sealing materials may be installed at the site or at the manufacturer's plant.
- G. Verify that drainage structures installed satisfy required alignment and grade.
- H. Remove knockouts or cut structure to receive piping so as not to create openings more than that required to receive pipe. Fill annular space with mortar and contour finish surfaces on both interior and exterior of structure for a clean, solid appearance.
- I. Cut pipe to finish flush with interior of structure.
- J. Shape inverts through structure as shown on Drawings to provide positive flow.

### **3.5 CASTINGS INSTALLATION**

- A. Set frames using mortar and masonry or precast grade rings as required to bring to grade. Smooth exterior courses with mortar parge.
- B. Set frame and cover 2 inches above finished grade for manholes and other structures with covers located within unpaved areas to allow the area to be graded away from the cover beginning 1 inch below the top surface of the frame.
- C. Provide concrete collar flush with top of frame within unpaved areas.

### **3.6 FIELD QUALITY CONTROL**

- A. Field tests will be used to evaluate and approve cast-in-place concrete in accordance with Section 03 30 00.
- B. Vertical Adjustment of Existing Manhole and Drainage Structures:
  - 1. Where required, adjust the top elevation of existing manholes and drainage structures to suit finished grades shown on Drawings.
  - 2. Reset existing frames, grates and covers, carefully removed, cleaned of all mortar fragments, to the required elevation in accordance with the requirements specified for installation of castings.
  - 3. Remove the concrete so as not to damage the existing vertical reinforcing bars when removal of an existing concrete wall is required. The vertical bars shall be cleaned of all concrete and bent into the new concrete top slab or spliced to required vertical reinforcement, as shown on Drawings.

4. Clean and apply sand-cement bonding compound on all existing concrete surfaces to receive cast-in-place concrete. Sand-cement bonding compound and its application shall be in accordance with Section 03 30 00.

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