

**SECTION 33 05 16.13****FACILITY STORM DRAINAGE PIPING (Storm Inlets, Catch Basins, Endwalls)****PART 1 GENERAL****1.1 DESCRIPTION**

- A. The work of this section includes, but is not limited to:
1. Storm drainage inlets
  2. Storm drainage catch basins
  3. Storm drainage pipe endwalls
  4. Pipe culvert end sections
- B. Related Work Specified Elsewhere:
1. Earth Moving (Trenching, Backfilling and Compacting): Section 31 20 00.02
  2. Erosion and Sedimentation Controls: Section 31 25 00
  3. Asphalt Paving (Bituminous paving and surfacing): Section 32 12 16
  4. Manholes and Structures: Section 33 05 13
  5. Facility Storm Drainage Piping (Storm Drain Pipe): Section 33 41 00
  6. Concrete (Plain and Reinforced Cement Concrete): Section 32 13 13.01
  7. Concrete (Cement Concrete for Utility Construction): Section 32 13 13.03
- C. Definitions: NONE
- D. Applicable Standard Details:  
As shown on the Contract Drawings, in accordance with Publication 408 Specifications.

**1.2 QUALITY ASSURANCE**

- A. Reference Standards:
1. Pennsylvania Department of Transportation (PennDOT), latest revision:  
Publication 408, Specifications  
Publication 72M, Standards for Roadway Construction
  2. American Society for Testing and Materials (ASTM):  
A36 Specification for Carbon Structural Steel  
A47 Specification for Ferritic Malleable Iron Castings  
A48 Specification for Gray Iron Castings  
A185 Specification for Steel Welded Wire Fabric for Concrete Reinforcement  
A536 Specification for Ductile Iron Castings  
A615 Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement  
C32 Specification for Sewer and Manhole Brick (made from clay or shale)  
C270 Specification for Mortar for Unit Masonry
  3. Pennsylvania Code  
Title 67, Transportation, Chapter 459, Occupancy of Highway by Utilities.

**1.3 SUBMITTALS**

- A. Certificates:
1. Submit certification from material suppliers attesting that materials provided meet or exceed specification requirements.
- B. Shop Drawings:
1. Submit detailed Shop Drawings, including reinforcing steel details.

- C. Submit concrete mix designs, certified results of compressive strength tests, certified field tests and copies of batch slips for all cast-in-place inlets, catch basins or endwalls.

**1.4 JOB CONDITIONS:** Section not utilized.

**1.5 PRODUCT DELIVERY, STORAGE AND HANDLING**

- A. Precast Concrete Units:
  - 1. After fabrication and curing, transport the units to the job site. Protect until required for installation.
  - 2. Handle to avoid damage to surfaces, edges and corners and to avoid creation of stresses within the units.
- B. Inspections
  - 1. Inspection by the ENGINEER will, at a minimum, be made of materials upon delivery to the job site; of the subgrade, prior to construction or placement; and of the completed structure, prior to backfill.
  - 2. Precast cement concrete products shall be subject to rejection for failure to conform with these specifications or if any one of the following conditions is noted:
    - a. Fractures or cracks passing through the wall, except for a single end crack that does not exceed the depth of the joint.
    - b. Defects that indicate incorrect proportioning, mixing, and molding.
    - c. Surface defects larger than ½" diameter indicating honey-combed or open texture.
    - d. Damaged or cracked ends, where such damage would prevent making a satisfactory joint.
  - 3. Concrete Testing (For Cast-In-Place Work): Section 32 13 13.01.

**PART 2 PRODUCTS**

**2.1 MATERIALS**

- A. Temp Crushed Stone Subbase:
  - 1. AASHTO No. 8 or 57, Type C, Section 703.2, Publication 408 Specifications. Do not use slag or cinders.
- B. Brick: ASTM C32 Grade SS, solid.
- C. Masonry Mortar: ASTM C270, Type S.
- D. Malleable Iron Castings: ASTM A47, Grade 35018, Domestic.
- E. Ductile Iron Castings: ASTM A536, Grade 60-40-18, Domestic.
- F. Structural Grade Carbon Steel: ASTM A36.
- G. Cast-in-Place Cement Concrete: Section 321313.01.
- H. Cast Gray Iron Castings: ASTM A48.

**2.2 FABRICATIONS**

- A. Precast Cement Concrete Units:
  - 1. Comply with the requirements of Section 714, Publication 408 Specifications. Concrete shall be Class AA, unless otherwise specified.
  - 2. All reinforcing shall comply with the requirements of Publication 72M.
  - 3. 6' inlets shall be similar in all respects to standard inlets except that the longitudinal dimension shall be increased by 24".
  - 4. Modified boxes (PennDOT Type 1, 2 or 3, Modified Type I or Modified Type II) shall have reinforced cover adjustment slabs in accordance with Details in Publication 72M.

- B. Pipe Culvert End Sections:
  - 1. Concrete or Metal - Comply with the requirements of, Publication 72M, RC-33.
  - 2. Polyethylene end sections shall have smooth interior and be anchored at the flared end.
- C. Inlet Grates:
  - 1. Comply with the requirements of Publication 72M, RC-34 PennDOT approved diagonal or bicycle safe grates.
  - 2. 6' inlet grates shall be similar in all respects to standard inlet grates except that the longitudinal dimension shall be increased by 24".
  - 3. Inlet grates in traffic areas shall be capable of handling HS-25 loading.
  - 5. Welded structural steel grates and frames shall be coated with bituminous paint. All iron castings shall be furnished unpainted.
- D. Adjustments
  - 1. Precast cement concrete grade adjustment risers: Shall be cast from 4000 psi concrete (28-day compressive strength), shall be a maximum of 2" thick, and shall be reinforced in accordance with ASTM A478.
  - 2. Brick adjustments are not permitted.
  - 3. Infra-Riser adjustment rubber rings manufactured by East Jordan Iron Works, East Jordan Michigan or approved equal, may be substituted for concrete rings if approved by the ENGINEER.
- E. Outlet Structures
  - 1. Precast concrete or cast-in-place concrete in accordance with Paragraph A.
  - 2. Construct outlet structures to dimensions shown on Contract Drawings.

**PART 3 EXECUTION****3.1 EXCAVATION**

- A. Excavate as specified in Section 31 20 00.02.
- B. Excavate at location marked in the field.
- C. Excavate to the required depth and grade for the bottom of the unit plus that excavation necessary for placement of base material.

**3.2 CONSTRUCTION**

- A. Construct inlets and catch basins of either precast cement concrete sections or of cast-in-place cement concrete, and of the type indicated on the Contract Drawings.
  - 1. Place precast units on a minimum 4" compacted crushed aggregate base.
  - 2. Construct cast-in-place units on a minimum 4" compacted crushed aggregate base.
  - 3. Pour channels in inlet boxes to channel the flow of water to the outlet pipe and to prevent water from standing in box.
  - 4. Unless units are cast-in-place, use precast cement concrete grade adjustment risers or Infra Risers to adjust to grade. Mortar concrete risers in place.
  - 5. Place bicycle safe grates in all paved (present or future) areas.
- B. Construct endwalls to the dimensions and design indicated on Standard Drawing RC-31, Publication 72M, and of the type shown on the Contract Drawings. Construct endwalls of monolithically cast reinforced concrete.
- C. Do not permit pipes to project more than 3" into inlets. Do not expose end of pipe through faces of endwalls.
- D. Where indicated on the Contract Drawings, provide pipe culvert end sections of the design and dimensions of Standard Drawing RC-33, Publication 72M.

- E. Install polyethylene end sections in accordance with manufacturer's instructions, bedded and anchored as required.
- F. Construct basin outlet structures with inverts, grates and openings at the required elevations shown on the Contract Drawings. Connect to new or existing outlet pipes, relaying or adding pipe as needed to meet the structure.
- G. At junction of different sized pipes, the pipe crowns should match.

**3.3 BACKFILLING**

- A. Backfill structures only after inspection by the ENGINEER.
- B. Perform backfilling and compaction as specified in Section 31 20 00.02.

**3.4 DISPOSAL OF EXCAVATED MATERIAL: Section 31 20 00.00.****3.5 RESTORATION OF SURFACE AREAS**

- A. Restore paved areas in accordance with Section 32 13 13.02.
- B. Restore unpaved surfaces as specified in Section 31 20 00.02.

**END OF SECTION**