

## SECTION 02082

### PUBLIC UTILITY MANHOLES AND STRUCTURES

#### PART 1 GENERAL

##### 1.1 SUMMARY

###### A. Section Includes:

1. Modular precast concrete manholes with tongue-and-groove joints, transition to cover frame, covers, anchorage, and accessories.
2. Modular precast concrete pump wetwell.
3. Manhole linings.
4. Pipe connections.
5. Manhole bedding and cover materials.
6. Schedule of Lined Structures.

###### B. Related Sections:

1. Section 02060 – Aggregates for Earthwork.
2. Section 02324 – Trenching.
3. Section 02539 – Sanitary Sewer Piping.
4. Section 02952 – Sewer and Manhole Testing.

##### 1.2 REFERENCES

###### A. American Concrete Institute:

1. ACI 530/530.1 - Building Code Requirements for Masonry Structures and Specifications for Masonry Structures.

###### B. ASTM International:

1. ASTM A48/A48M - Standard Specification for Gray Iron Castings.
2. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
3. ASTM C39/C39M - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens.
4. ASTM C55 - Standard Specification for Concrete Brick.

5. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections.
6. ASTM C497 - Standard Test Methods for Concrete Pipe, Manhole Sections, or Tile.
7. ASTM C923 - Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals.

C. National Precast Concrete Association:

1. NPCA Quality Control Manual for Precast Plants.
2. NPCA Plant Certification Program.

1.3 SUBMITTALS

- A. Section 01330 - Submittal Procedures: Requirements for submittals.
- B. Product Data: Submit component construction, features, configuration, and dimensions for manhole covers, manhole steps, pipe connection fittings

1.4 CLOSEOUT SUBMITTALS

- A. Section 01700 – Closeout Procedures: Requirements for submittals.

1.5 QUALITY CONTROL

- A. Obtain precast concrete utility structures from single source.
- B. Perform structural design in accordance with ACI 318.

1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum three years experience; pre-approved by PennDOT (Bulletin 15 listed) and certified by the National Precast Concrete Association.
- B. Installer: Company specializing in performing work of this section with minimum three years experience.
- C. Welders: AWS qualified within previous 12 months.
- D. Designer: Qualified professional; registered in the State in which the Work is located.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Section 01400 - Product Requirements: Product storage and handling requirements.
- B. Comply with precast concrete manufacturer's instructions and ASTM C913 for unloading, storing and moving precast manholes and drainage structures.
- C. Inspect all precast products upon delivery to site. Immediately remove from site all damaged and rejected products.
- D. Store precast concrete manholes and drainage structures to prevent damage to Owner's property or other public or private property. Repair property damaged from materials storage.
- E. Mark each precast structure by indentation or waterproof paint showing date of manufacture, manufacturer, and identifying symbols and numbers shown on Drawings to indicate its intended use.

1.8 ENVIRONMENTAL REQUIREMENTS

- A. Cold Weather Requirements: ACI 530/530.1.

1.9 DESIGN REQUIREMENTS

- A. Design manholes for AASHTO HS-25 highway loading.
- B. Design pump station site structures for minimum loads in accordance with the following:
  - 1. Roof Live Load: Comply with the following loading conditions, including impact load.
  - 2. Walkway Traffic: ASTM C857; A-0.3, maximum 300 psf.
  - 3. Wall Live Load: Accommodate surcharge from roof live load.
  - 4. Base Live Load: Accommodate roof and wall live loads transferred to base.
  - 5. Dead Loads: Actual weight of materials producing static load.

PART 2 PRODUCTS

2.1 MANHOLES

- A. Manufacturers:
  - 1. Monarch Precast Concrete Corp.
  - 2. Modern Precast Concrete.

3. Terre Hill Concrete Products Inc.
  4. Substitutions: Section 01600 - Product Requirements, or approved equal.
- B. Manhole and Structure Sections: Reinforced precast concrete in accordance with ASTM C478 with gaskets in accordance with ASTM C923.

### C. Grade Adjustment Rings

1. Pro Ring – Adjustments from 0”-12”. Use grade rings to match existing cartway cross scope. No bolts required if used in bituminous roadway. (Cretex product)
2. Poured in place – Adjustments from 0” – 12”.
3. Infra Riser – Adjustments 0” – 3”. Use grade rings to match existing cartway cross scope. (East Jordan)

## 2.2 PRECAST CONCRETE UTILITY STRUCTURES

### A. Fabricators:

1. Modern Precast Concrete.
2. Monarch Precast Concrete Corp.
3. Terre Hill Concrete Products, Inc.
4. Substitutions: [Section 01600 - Product Requirements].

### B. Precast Concrete Utility Structures: Reinforced precast concrete.

### C. Foundation Slab: [Precast] concrete, integral with bottom wall section.

## 2.3 MANHOLE FRAMES AND COVERS

### A. Manufacturers:

1. East Jordan Iron Works, Series 1045.
2. Campbell Foundry Co.
3. Neenah Foundry Co.
4. Substitutions: Section 01600 - Product Requirements.

### B. Product Description: ASTM A48/A48M, Class 30B Cast iron construction.

1. Lid: Machined flat bearing surface, removable lid, checkerboard cover design, closed (no holes); HS-25 load rating; two recessed pick holes; sealing gasket in machined groove on underside of lid; cover cast with 2” high recessed flush identifying letters “SANITARY SEWER”.

2. Nominal Lid Size: 26" diameter; Frame Opening: 24" diameter. Heidelberg Township
3. Frame Height: 7 inches.
4. Watertight frames and covers – Bolt-Down Type. Required as indicated on plan drawing.

## 2.4 MANHOLE STEPS

### A. Manufacturers:

1. M.A. Industries, Inc., PS2-PFS.
2. Substitutions: Section 01600 - Product Requirements.

### B. Product Description:

1. Formed polypropylene rung with non-slip surface pattern and raised sides; 14" wide tread; 6" projection from face of structure; 3-3/8" embedment. Reinforced with fully encapsulated 1/2 inch Grade 60 steel bar.
2. Factory installed in precast structures; locations and spacing as indicated on Drawings.
3. Where location in manholes is not indicated, locate steps as nearly perpendicular (90 degrees) to flow channel as possible to ensure safe access to working manhole floor.

## 2.5 ACCESSORIES

### A. Bituminous Exterior Coating:

1. Manufacturers:
  - a. Koppers, Bitumastic Super-Service Black.
  - b. Porter, Tarmastic 103.
  - c. Hydroside, 648.
  - d. Tnemec, 450 Heavy Tnemecol.
  - e. Substitutions: Section 01600 - Product Requirements.
2. Product Description: Coal tar epoxy coating, minimum 16 mils DFT, applied to all structures under this Section.

B. Preformed Joint Sealing Compound:

1. Manufacturers:
  - a. K.T. Snyder Company, Inc., RUB-R-NEK., LTM LU106
  - b. NPC, Inc., Bidco C-56.
  - c. Press Seal Pro-Stik
  - d. Substitutions: Section 01600 - Product Requirements.
2. Product Description: Butyl rubber base, conforming to Federal Specification SS-S-210 A, Type I; in rope form, supplied with a two-piece cover to preclude adhesion until use; minimum size of 7/8 inch by 1-3/8 inches or equivalent to 1-1/4 inches round.

C. Cast-in-Place Pipe-to-Manhole Gasket:

1. Manufacturers:
  - a. Press-Seal Gasket Corp., Econoseal.
  - b. A-Lok Products, Inc., X-CEL.
  - c. The James Company, Starseal.
  - d. Substitutions: Section 01600 - Product Requirements.
2. Product Description: Cast-in-place resilient sealing connector; ASTM C923.

D. Concrete: PennDOT Specifications, Section 704, Class AA.

E. Mortar and Grout:

1. Prepared Mortar Mix: ASTM C91, Type II.
2. Field Prepared Mix: 1 part cement, 1 part lime, 5 parts damp, loose sand.
  - a. Cement: Portland Cement, ASTM C150, Type I.
  - b. Lime: Hydrated lime, ASTM C207, Type S.
  - c. Sand: ASTM C144.

2.6 BEDDING AND COVER MATERIALS

A. Bedding: Section 02060, No. 57 coarse aggregate.

B. Backfill: Section 02324.

## 2.7 CONFIGURATION

- A. Manhole Shaft Construction and Eccentric Cone Top Section: Reinforced precast concrete pipe sections, lipped male/female joints, sleeved to receive pipe(s). Design total height of precast assemblies to require less than 6 inches of adjustment rings for placement of casting and cover to proper elevation.
- B. Top Slab: Provide flat slab top section when total height, from lowest invert to finished grade, is less than 5.0 feet, or when specifically indicated on Drawings.
- C. Base Configuration: Integral precast floor slab and factory installed flow channels, except aggregate working floor for force main cleanout and relief valve manholes.
- D. Interior Lining: Spray lining of structures listed in Schedule.
- E. Clear Inside Dimensions: As indicated on Drawings.
- F. Design Depth: As indicated on Drawings.
- G. Clear Cover Opening: As indicated on Drawings.
- H. Pipe Entry: Furnish openings as indicated on Drawings.
- I. Drop Entry: The Contractor shall build drop connections where the drop in the invert is 2 feet or more. Drop connections shall be of the same pipe material used to construct the main from which the drop connection is made. All drop connections shall be inside drop connects as shown on the Standard Drawings.
- J. Steps: 14 inches wide, 12 inches on center vertically, set into structure wall at precast factory.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Section 01300 - Administrative Requirements: Verification of existing conditions before starting work.
- B. Verify built-in items are in proper location, and ready for roughing into Work.
- C. Verify correct size of manhole and structure excavation.

### 3.2 PREPARATION

- A. Coordinate placement of inlet and outlet pipe openings required by designs.
- B. Do not install manholes where site conditions induce loads exceeding structural capacity of manholes.

- C. Inspect precast concrete manholes immediately prior to placement in excavation to verify manholes are internally clean and free from damage. Remove and replace damaged units.

### 3.3 INSTALLATION - GENERAL

#### A. Excavation and Backfill:

1. Excavate for manholes and structures in accordance with Section 02324 in location and to depth shown. Provide clearance around sidewalls of manhole for construction operations, backfilling and compaction.
2. Place bedding material to depth indicated and compact to minimum 98 percent of maximum dry density.
3. When groundwater is encountered, prevent accumulation of water in excavations. Dewater in accordance with Section 01570. Place manholes in dry trench.
4. Where possibility exists of watertight manhole becoming buoyant in flooded excavation, anchor manhole to avoid flotation.

- B. Install manholes sections plumb and level, supported at proper grade and alignment on crushed stone bedding as shown on Drawings.

- C. Backfill excavations for manholes in accordance with Section 02324.

### 3.4 PRECAST CONCRETE MANHOLE AND STRUCTURE INSTALLATION

- A. Lift precast sections at factory supplied lifting points using spreader beams and lifting devices approved by manufacturer.
- B. When lowering structures into excavations and joining pipe to units, take precautions to ensure interior of pipelines and precast structures remain clean.
- C. Set precast structures bearing firmly and fully on approved crushed stone bedding, compacted in accordance with provisions of Section 02324; depth as shown on Drawings.
- D. Assemble multi-section structures by lowering each section into excavation. Lower, set level, and firmly position base section before placing additional sections. Align steps of subsequent sections vertically above steps below. Install Butyl Rubber Mastic Sealant into joints between precast sections, two strips in each joint, in accordance with manufacturer's recommendations.
- E. Remove foreign materials from joint surfaces and verify sealing materials are placed properly. Maintain alignment between sections by using guide devices affixed to lower section.
- F. Verify precast installed structures satisfy required plumbness, alignment and grade.



- G. Cut pipes to finish within 2-3" reveal with interior of structure.
- H. Provide smooth trowel finish transition from pipe to flow channel from just above spring line to invert.

3.5 SANITARY MANHOLE DROP CONNECTIONS

- A. Construct drop connections into sanitary manholes in accordance with Drawings.

3.6 CASTINGS INSTALLATION

- A. Set frames to elevations as indicated on Drawings. Use poured concrete or adjustment rings as necessary. Use adjustment rings for elevation adjustment of less than 12 inches; otherwise, use precast manhole sections.
- B. Set frame and cover flush to finished grade, unless indicated otherwise.

1. Tolerance:

- a. Paved areas – 1/4 inch to 3/4 inch below finished paving elevation, matching slope and crown of finished surface.
- b. Unpaved areas – Plus or minus 1 inch from finished grade.
- C. Parge exterior of riser assembly with mortar and apply approved bituminous coating (20 mils).

3.7 ACCESSORIES

- A. Install pipe supports, equipment and other accessories as indicated on Drawings.

3.8 TESTING

- A. Test all installed manholes and structures in accordance with Section 02952.
- B. When directed by the Engineer, retest any manholes that have been damaged and repaired after acceptance testing.

3.9 FIELD QUALITY CONTROL

- A. Section 01700 – Closeout Procedures: Protecting Installed Construction.
- B. Protect completed manholes from damage. Repair any manholes damaged.

END OF SECTION