

## SECTION 03480

### PRECAST CONCRETE VAULTS AND CHAMBERS

#### PART 1 - GENERAL

##### 1.01 DESCRIPTION

###### A. Work Specified

The work specified shall include all labor, materials, tools, equipment, services and incidentals necessary to furnish valve and meter vaults, air release manholes, surface water inlets, and similar structures, complete with frames and covers, manhole steps and appurtenances as shown on the Contract Drawings.

###### B. Related Work Specified Elsewhere

1. Section 02316 - Select Granular Materials
2. Section 02351 - Excavation, Backfill, and Trenching
3. Section 03300 - Concrete
4. Section 15051 - Buried Piping Installation
5. Section 15106 - Ductile Iron pipe, Fittings, and Accessories
6. Section 15110 - Valves and Appurtenances
7. Section 15120 - Piping Specialties and Accessories

##### 1.02 QUALITY ASSURANCE

###### A. Reference Standards

1. ASTM A48 - Standard Specification for Grey Iron Castings
2. ASTM C62 - Standard Specification for Building Brick (solid Masonry Units made from Clay or Shale)
3. ASTM C91 - Standard Specification for Masonry Cement
4. ASTM C139 - Standard Specification for Concrete Masonry Units for Construction of Catch Basins and Manholes
5. ASTM C144 - Standard Specification for Aggregate for masonry Mortar
6. ASTM C478 - Standard Specification for Precast Reinforced Concrete Manhole Sections
7. ASTM C913 - Standard Specification for Precast Concrete Water and Wastewater Structures
8. AWWA Standards identified in other related sections
9. ASTM Standards identified in other related sections
10. ANSI Standards identified in other related sections
11. Occupational Safety and Health Administration (OSHA)

## 1.03 SUBMITTALS

### A. Shop Drawings

1. Prior to any field construction, the CONTRACTOR shall submit review drawings and conformance data for materials to be used in the construction of vaults and inlets for review.

## PART 2 - PRODUCTS

### 2.01 PRECAST CONCRETE STRUCTURES

#### A. General: the following requirements apply to all precast concrete structures, chambers, and vaults constructed on this project.

1. All precast concrete structures shall be designed by a licensed New York State registered Professional Engineer. Each drawing for design shall be stamped and signed by the Professional Engineer.
2. Precast concrete structures shall be manufactured in accordance with ATM C478, latest revision, and shall be designed for HS-20 Live Load, latest revision.
3. Precast concrete structures shall be of approved design and sufficient strength to withstand the loads to be imposed upon them. An approved watertight joint shall be provided between precast concrete sections.
4. Mark date of manufacture and name or trademark of manufacturer on inside of precast concrete chamber section.
5. Sizes of precast concrete structures shall be as shown on the drawings.
6. All concrete in precast units shall be stone aggregate and develop a strength of 4,000 psi at 28 days and shall conform to the following specifications:
  - a. All concrete furnished and installed for precast concrete vaults shall be in accordance with ACI 318 Code for Reinforced Concrete.
  - b. Materials:
    - 1) Cement: Portland Cement, ASTM C150, Type I or Type II.
    - 2) Admixtures: Admixtures other than air entraining shall not be used. Air entraining admixture shall conform to ASTM C260. Air content of concrete with  $\frac{3}{4}$ -inch maximum size aggregate shall be 6 percent plus or minus 1 percent volume.
  - c. Water: Clean and free from injurious amounts of oils, acids, alkalis, organic materials, or other substances.
  - d. Aggregates: aggregates shall conform to ASTM C33, latest revision. Course aggregate shall be size number 67 (nominal  $\frac{3}{4}$ -inch to No. 4).

- e. Proportions of materials in concrete and strength of concrete shall be subject to the following conditions:
  - 1) Minimum 28-day compressive strength – 4,000 psi.
  - 2) Maximum water to cement ration by weight – 0.45.
  - 3) Minimum cement content 600 lbs/cubic yard.
- 7. All precast concrete shall be manufactured by wet cast methods only, and shall be approved design.
- 8. All precast concrete shall be reinforced. Reinforcing shall be designed for all applicable loads and forces encountered. Steel reinforcing shall be ASTM A 496-A 615 Grade 60-60 KSI.
- 9. Prior to backfilling, all below grade exterior faces of the concrete structures shall be painted with two coats of sealer. The sealer shall be Bitumastic 300-M, a comparable grade of Carboline, or approved equal.

## 2.02 CHAMBER, VAULT, AND MANHOLE CONSTRUCTION DETAILS.

- A. Precast concrete chamber, vault, bases, and manholes shall have monolithic reinforced concrete and shall have a keyway type joint between precast concrete sections.
- B. Joint between precast concrete section shall be sealed as recommended by manufacturer and shall be watertight upon completion of joint. Joints shall be buttered inside and outside with 1 to 2 cement brick sand mortar.
- C. Where the proposed piping passes through exterior walls of precast concrete chambers and vaults, the manufacturer shall provide an oversized opening and mechanical type seal or shall provide an assembly consisting of a flexible rubber boot with clamp assembly. The boot assembly shall meet the requirements of ASTM C-923 and shall have a stainless steel power sleeve and clamps.
- D. All precast concrete chambers and vaults shall be furnished with a sump assembly as shown on the drawings.
- E. Product and manufacturer:
  - 1. Kistner Concrete Products.
  - 2. Fort Miller, Inc.
  - 3. Or approved equal.

## 2.03 PRECAST CONCRETE CATCH BASINS.

- A. In addition to the general requirements for precast concrete structures outline above, the following shall apply:
  - 1. Precast concrete catch basins shall be manufactured as one or two piece units with integral bottom and wall cast in one pour per piece so that there are no joints present in the sections.

2. Catch basin base and walls shall be of acceptable design and of sufficient strength to safely support HS-20 loading.
3. For precast concrete base section, the minimum thickness of base slab shall be 6-inch thickness.
4. Precast concrete walls for catch basin shall be 6-inch thickness except at knockouts where the minimum thickness shall be 2 inches.
5. Pipe connections to catch basins for storm drainage piping shall consist of a knockout in the catch basin wall for installation of the proposed piping. The void between the proposed piping and the wall of the catch basin shall be grouted with cement – mortar grout and shall be approved by the ENGINEER.
6. Product and manufacturer:
  - a. Kistner Concrete Products.
  - b. Fort Miller, Inc.
  - c. Or approved equal.

#### 2.04 MISCELLANEOUS METALS.

##### A. Steps.

1. Provide approved aluminum steps as follows:
  - a. Aluminum-magnesium-silicide type alloy conforming to ASTM Specification B221.
  - b. Drop front design with grooved step surface.
  - c. Conform to details shown on Drawings.
  - d. Aluminum surfaces embedded in concrete and in contact with dissimilar materials shall be painted with an approved bitumastic paint.

##### B. Ladders.

1. For Venturi Vaults, provide approved ladders as follows:
  - a. Produce from ASTM A36 steel, galvanized.
  - b. Shall have 1-inch diameter rungs spaced a maximum of 12-inch on centers.
  - c. Conform to all applicable OSHA 1910.27 requirements for fixed ladders.
  - d. Designed for a single concentrated load of 200 pounds minimum.
  - e. Minimum ladder width of 16 inches.
  - f. Length as required to extend from underside of slab to top of floor.
  - g. Shall be attached to wall with galvanized steel hardware suitable for all loads imposed upon them and as recommended by the ladder manufacturer.
  - h. All ladders shall have a dismount system that enables the climber to safely dismount the vaults. The system shall be the Saf-T-Pivot Dismount as manufactured by North Safety or equal.

- C. Hatch Cover Assembly (pressure reducing valve chamber and meter pits).
1. Hatch cover assembly shall be furnished with a riser for each precast concrete structure. Riser shall be manufactured from concrete meeting the requirements as outlined above for precast concrete vaults.
  2. Hatch cover shall be a single leaf type assembly with extruded aluminum angle style frame and continuous anchor flange. Hatch cover and assembly shall be manufactured from 6061-T6 aluminum for bars, angles, and extrusions.
  3. Hatch leaf shall be manufactured from diamond plate and shall be 5086 aluminum. Each hatch shall be furnished with an aluminum hold open arm.
  4. Door lock shall open in 90° position and shall be supplied with an exposed padlock clip.
  5. Hinges shall be heavy-duty type, brass alloy, with 65,000 psi tensile strength, and a ¾-inch Grade 316 stainless steel pin.
  6. Each hatch shall be furnished with an aluminum lift handle flush with top of diamond plate leaf. All aluminum shall have mill finish.
  7. Hatch cover assembly shall be as manufactured by Bilco.
- D. Frames and Cover-Catch Basins.
1. Made from best merchantable gray cast iron, tough, even-grained, and free from all flaws and injurious or unsightly defects, ASTM A48, Class 30, cast iron.
  2. Frame and covers shall be rated for HS-20 loading, latest revisions.
  3. All covers for catch basins shall be bicycle safe type covers.
  4. Letters to be cast on every manhole cover as shown on the Drawings. If not detailed on drawings, covers for manhole vaults shall be provided with the designation "water."
  5. Machined to insure proper fit and even bearing in all positions.
  6. Properly clean castings and coat with asphaltic varnish applied by immersion, while the coating is hot.
  7. Product and manufacturer:
    - a. Provide one of the following:
      - 1) Valve Manhole Vaults
        - a) Neenah Foundry Co., Model R1916-C Watertight Manhole Frame and Cover.
        - b) Or approved equal.
      - 2) Catch Basins.
        - a) Catch Basin Frame and Cover – Grate Top – Model No. R4832B, Bicycle Proof, by Neenah Foundry Co.
        - b) Or approved equal.

## PART 3 - EXECUTION

### 3.01 INSPECTION

#### A. Precast Sections

1. Precast section shall be installed level on a flat stable subgrade. Where an unstable condition exists, the CONTRACTOR shall excavate the unstable material and replace with compacted granular material.
2. All joints shall be filled inside and out with mortar to provide a smooth and continuous surface.

#### B. Benchwalls and Inverts

Mortar surfaces of benchwalls and concrete floors shall be given a broom finish. Where inverts are required they shall be lined with a half section of pipe of the same type used for the sewer or shall be constructed of Class "B" concrete, shaped and troweled to produce a smooth circular cross-section.

#### C. Frames and Castings

Frames and castings shall be set in a full bed of mortar a maximum of  $\frac{1}{2}$ " thick. Where required to adjust the frames and castings to grade there shall be installed to a maximum of four brick courses.

#### D. Steps

1. Steps shall be installed in vertical alignment spaced 12-inches on center.
2. In concrete sections the steps shall be cast into the section or secured with cadmium plated bolts to threaded inserts which are precast into the concrete.
3. In masonry construction the steps shall be built into the masonry walls.

#### E. Plastering

1. Plaster shall be with mortar not less than 2-inch thick and troweled smooth.
2. Outside of masonry structures.
3. Inside and outside of brick courses under frames and castings.

#### F. Sumps

Sumps of the size specified shall be built into the floors of vaults and similar structures. Floors shall be sloped to the sump.

#### G. Lifting holes shall be sealed tight with a solid rubber plug driven into hole and remaining void filled with a mix of 1 part cement and 2 part sand mortar.

#### H. All precast concrete structures shall be free from visible leakage: each structure shall be tested for leaks and inspected and all leaks shall be repaired in a manner subject to the ENGINEER'S approval.

I. Grading at chambers:

1. All precast concrete structures in unpaved areas shall be constructed as shown or directed to an elevation 6 inches higher than the original ground.
2. The ground surface shall be graded to drain away from structure. Fill shall be placed around them to a level of the upper rim of the frame and cover, and the surface evenly graded on 1 to 5 slope to the existing surrounding ground. The slope shall be covered with 4 inches of topsoil, seeded, and maintained.
3. All precast structures installed with or under pavement areas shall be constructed to an elevation, which permits the frame and cover to be set flush with the final paving grade.

END OF SECTION