SECTION 03420 - PRECAST REINFORCED CONCRETE VAULTS

PART 1 - GENERAL

1.1 DESCRIPTION:

A. This section includes materials, design, and installation of factory-built precast reinforced concrete underground vaults.

1.2 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO):

1. HB: Standard Specifications for Highway Bridges.

2. M198: Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants

B. American Concrete Institute (ACI):

1. 318: Building Code Requirements for Structural Concrete and Commentary

C. American Society for Testing and Materials (ASTM):

1. A48: Standard Specification for Gray Iron Castings.

2. A615: Standard Specification for General Requirements for Stainless Steel Wire and Wire Rods.

3. C31: Practice for Making and Curing Concrete Test Specimens in the Field

4. C33: Specification for Concrete Aggregates

5. C39: Test Method for Compressive Strength of Cylindrical Concrete Specimens

6. C143: Test method for Slump of Hydraulic Cement Concrete

7. C150: Specification for Portland Cement

8. C172: Practice for Sampling Freshly Mixed Concrete

9. C192: Practice for Making and Curing Concrete Test Specimens in the Laboratory

10. C231: Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

11. C260: Specification for Air-Entraining Admixtures for Concrete

12. C494: Specification for Chemical Admixtures for Concrete

13. C857: Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures

14. C858: Specification for Underground Precast Utility Chambers

15. C1064: Test Method for Temperature of Freshly Mixed Portland Cement Concrete

16. D75: Practice for Sampling Aggregates

17. D4101: Standard Specification for Polypropylene Injection and Extrusion Materials

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. The Work of the following Section applies to the Work of this Section. Other Sections, not referenced below, shall also apply to the extent required for proper performance of this Work.

1. Section 01300 – Record Drawings and Submittals
2. Section 01400 – Quality Control
3. Section 01600 – Materials and Equipment
4. Section 03300 – Cast in Place Concrete
5. Section 07100 – Waterproofing
6. City of Oceanside Water, Wastewater, and Recycled Water Design and Construction Manual (Water Utilities Manual)

1.4 SUBMITTALS

A. Shop Drawings: Submit the following in accordance with the Water Utilities Manual.

1. Completely detailed shop drawings for precast concrete vaults. Indicate all dimensions, details, reinforcing steel, inserts, connections, openings and lifting devices. Mark each component for identification. Show mark on erection plan and place legibly on unit at time of manufacture.

B. Drawings of modifications or changes in features or details, which are necessitated by design requirements.

C. Do not fabricate precast concrete vaults before shop drawings are accepted by the AGENCY.

D. Certification, signed and sealed by a Professional Structural Engineer registered in the state where the vaults will be installed and employed by the vault manufacturer and stating:

1. Elements and connections are designed to withstand required loads and forces

2. Structure is not affected by buoyant forces.

3. Codes and specifications to which structural design conforms.

1.5 QUALITY ASSURANCE

A. Comply with the requirements specified in standard specifications.

B. Vault design and construction comply with the specified design load conditions, ASTM C858 and as specified herein.

1.6 DELIVERY, STORAGE AND HANDLING

A. Comply with the requirements specified in the standard specifications.

B. Store vaults on clean blocking, off the ground and protected from rain and ground splatter.

PART 2 - PRODUCTS

2.1 PRECAST REINFORCED CONCRETE VAULTS

A. Manufacturers:

1. Oldcastle Precast, Inc.

2. Jensen Precast, Inc.

3. or approved equal

B. Materials:

1. Minimum concrete compressive strength of 5,000 psi at 28 days conforming to the standard specifications.

2. Portland cement: ASTM C150, Type II.

3. Coarse Aggregate and sand conforming to the standard specifications.

4. Steel reinforcement conforming to ASTM A615, Grade 60.

5. Water: Potable.

6. Provide air entraining and water reducing concrete admixtures as specified in the standard specifications.

7. Butyl rubber-based sealants conforming to AASHTO M198, Type B but with no bitumen content.

8. Non-Shrink Grout:

   a. BASF Chemical Company; Masterflow 713 Plus

   b. The Euclid Chemical Co.; Euco NS Grout

   c. Sika Corporation; SikaGrout 212

   d. Or acceptable equivalent product

C. Design Criteria. Use design loads according to ASTM C857 or as indicated below, whichever produces the more severe conditions:

1. Design precast reinforced concrete vault to withstand earth and groundwater loads. Assume groundwater elevation to be at the top of the vault. Provide design based on an equivalent fluid pressure equal to a minimum of 95 pounds per cubic foot.

2. Design precast reinforced concrete vault to withstand internal hydrostatic and seismic loading. Assume internal fluid level to be at the top of the vault. Provide design based upon an equivalend fluid pressure of 65 pounds per cubic foot.

3. Design precast reinforced concrete vault to withstand vehicle loading with an impact factor as prescribed in ASTM C857 but a minimum of 250 pounds per square foot surcharge. Account for vehicle positions both above and alongside vault including directly on each manhole cover.

4. Design precast reinforced concrete vault ceiling to withstand additional concentrated loads from lifting hooks located directly above each valve, meter or other equipment. Provide lifting hook capable of supporting the load, but not less than 2,500 pounds each hook.

5. Design and install vaults to withstand hydrostatic uplift caused by a groundwater elevation at grade level or equal to the top of the vault, whichever produces the most severe condition. Use only the weight of the vault and hold-down slab to resist hydrostatic uplift with a minimum safety factory of 1.15. Do not include side friction of soil on walls.

6. Walls and floor slab: minimum of 8 inches in thickness. Cast lower wall section and floor slab together in one placement.

7. Precast reinforced concrete vault roof: minimum of 8 inches in thickness.

8. Design vault to withstand the load condition where the vault roof is removed while the structure is backfilled to grade and subject to live and dead loads.

9. Provide precast reinforced concrete vault as indicated on the drawings and in accordance with the Water Utilities Standard Drawings.

10. Fabricate precast reinforced concrete vault in sections for as required for installation.

11. Provide pipe sleeves with water stops, rubber pipe boots or other devices at pipe penetrations as indicated.

12. If applicable, provide reinforced concrete vertical entrance tube with inside dimensions as indicated.

2.2 WATERPROOFING

A. Provide waterproofing to vaults in accordance with the standard specifications.

B. Apply waterproofing to outside of walls, roof, and ceiling.

C. Coat interior of vaults in accordance with the Water Utilities Manual

2.3 ENTRANCE HATCHES

A. Provide access hatches in accordance with the standard specififcations

B. Manufacturers:

1. Bilco Co.

2. Halliday

3. Babcock-Davis Associates, Inc.

4. Or approved equal

2.4 LIFTING HOOKS

A. Provide lifting hooks in the ceiling above pumps, valves and meters.

PART 3 - EXECUTION

3.1 PROTECTION

A. Protect aluminum from contact with dissimilar metals, concrete, masonry or mortar.

B. Before coating and lining application, clean contact surfaces, remove dirt, grease, oil, foreign substances.

3.2 FINISHES

C. Finishes: Hatches to receive manufacturers' standard finish for aluminum.

3.3 INSTALLATION

D. Install precast reinforced concrete vault, and related appurtenances in accordance with manufacturer's instructions.

E. Place precast reinforced concrete vault onto level prepared bedding. Bedding shall consist of placing 12 inches of crushed ¾-inch aggregate over 95% realative compacted sub-base material. The crushed aggregate shall be well compacted and extend no less than 1 foot outside the base of the vault. Provide uniform bearing over entire base of vault.

F. Seal all joints inside and out with specified sealant to ensure joints are waterproof.

G. Repair or replace damaged waterproofing.

H. Backfill vault excavation uniformily and in such a manner so as not to damage the waterproofing.

3.4 CLOSEOUT ACTIVITIES

I. Provide in accordance with standard specifications.

****END OF SECTION****