

## **SECTION 03400**

### **PRECAST CONCRETE STRUCTURES**

#### **PART 1 - GENERAL**

##### **1.01 DESCRIPTION**

- A. Section includes specifications for precast concrete structures, including fabrication and erection.

##### **1.02 REFERENCE STANDARDS**

- A. American Society for Testing and Materials (ASTM International):
  - 1. A123 Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
  - 2. A153 Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
  - 3. C31 Making and Curing Concrete Test Specimens in the Field
  - 4. C39 Compressive Strength of Cylindrical Concrete Specimens
  - 5. C260 Specification for Air-Entraining Admixtures for Concrete
  - 6. C494 Specification for Chemical Admixtures for Concrete
  - 7. C618 Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
- B. American Welding Society (AWS):
  - 1. D1.1 Structural Welding Code – Steel
  - 2. D1.4 Structural Welding Code – Reinforcing Steel
- C. State of California, Department of Transportation (Caltrans), Standard Specifications:
  - 1. Section 51 Concrete Structures
- D. Precast/Prestressed Concrete Institute (PCI):
  - 1. MNL 116 Manual for Quality Control for Plants and Production of Structural Precast Concrete Products
  - 2. MNL 120 Design Handbook – Precast and Prestressed Concrete

### 1.03 SYSTEM DESCRIPTION

- A. Design precast components in accordance with PCI MNL 120.
- B. Fabricate and erect precast concrete units in accordance with PCI MNL-116, as indicated on the Contract Drawings and as specified herein.

### 1.04 SUBMITTALS

- A. Shop Drawings: Submit shop drawings prepared by an experienced professional detailer showing complete information for fabrication and installation of precast concrete units. Indicate unit dimensions and cross-section; fabrication tolerances; location, size, and type of reinforcement, including special reinforcement; and lifting devices necessary for handling and erection.
  - 1. Show layout, dimensions, and identification of each precast unit corresponding to sequence and procedure of installation.
  - 2. Indicate welded connections by AWS standard symbols. Detail inserts, connections, and joints, including accessories and construction at openings in precast units.
  - 3. Quantities, dimensions, and locations of sleeves, anchors, brackets, inserts, reglets, accessories, and methods of securing same in forms.
  - 4. Casting, consolidating, and finishing procedures.
  - 5. Include setting diagrams and instructions as required for installation.
- B. Submit concrete mix designs as specified under Section 03300, Cast-In-Place Concrete.
- C. Comply with the submittal requirements specified in Section 03200, Concrete Reinforcing, and Section 03300, Cast-In-Place Concrete.
- D. Product Data: Submit manufacturer's product data of manufactured products and accessories. Include manufacturer's detailed drawings and dimensions when applicable.
- E. Quality Assurance Submittals:
  - 1. Submit evidence of current plant certification under the PCI Plant Certification Program.
  - 2. Submit qualifications of fabricator including a list of three successfully completed precast jobs of similar type and size to the project. Include a detailed description of the fabricated structure, project name, location, general contractor, and engineer.
  - 3. For welders, furnish welding certificates or affidavits attesting to the welders' qualifications to perform the indicated and specified welding.

Welders shall be prequalified in accordance with AWS D1.1 or AWS D1.4, as applicable to the work

**1.05 QUALIFICATIONS OF THE FABRICATOR**

- A. Plant shall be PCI certified under the PCI Plant Certification Program or equivalent and regularly engaged in design and construction of structural precast concrete with a minimum of five (5) years experience. PCI Certification shall be in a product group and category appropriate to the work.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Transport, handle, and store precast units in a manner that will prevent damage to the units. Units shall be handled such that the points of the support and direction of the reactions with respect to the unit are approximately the same during transportation and storage as when the unit is in the final position.
- B. Store units in a manner that will prevent cracking, distortion, staining, or other damage. Units shall be stored above ground on skids or other supports to keep items free of dirt and other foreign debris.
- C. Units damaged by improper storage or handling shall be replaced or repaired to the satisfaction of the Engineer.

**PART 2 - PRODUCTS**

**2.01 MATERIALS**

- A. Precast concrete members shall conform to the provisions in Caltrans Standard Specifications, Section 51, "Concrete Structures", and as specified herein.
- B. Reinforcement: Comply with applicable requirements of Section 03200, Concrete Reinforcing.
- C. Concrete: Comply with the applicable requirements of Section 03300, Cast-In-Place Concrete, and the following:
  - 1. Flyash meeting the requirements of ASTM C618, Type C, may be used as a cement replacement only with the approval of the Engineer.
    - a. Type F may be used to modify potentially reactive aggregates
    - b. Flyash may replace up to 15 percent, by weight, of the cement
  - 2. Admixtures
    - a. All admixtures must be from the same manufacturer.
    - b. Air-entraining admixtures shall conform to ASTM C260 and shall be used to produce 6 to 8 percent entrained air in the concrete after all admixtures have been incorporated.
    - c. Water reducing admixtures meeting the requirements of ASTM

C494, Type A, may be used only with the approval of the Engineer.

d. Admixtures containing chlorides and sulfides are not acceptable.

2. Maximum total chloride ion content contributed from all ingredients of concrete including water, aggregates, cement, and admixtures measured as a weight percent of cement shall not exceed 0.06.

## 2.02 FABRICATION

- A. Field verify dimensions shown on the Contract Drawings prior to fabrication of any precast concrete structure. Notify the Engineer of any differences between field measurements and those shown on the Contract Drawings.
- B. The manufacture, quality, dimensional, and erection tolerances of all precast units shall be in accordance with PCI MNL 116.
- C. Forms shall be accurately constructed to produce units to dimension, shape, configuration, and profile indicated. When not otherwise indicated, construct forms to produce smooth concrete.
- D. Anchors, Lift Devices, and Accessories: Provide concrete inserts, reglets, anchors, brackets, and fasteners as indicated or required for fabrication and installation work. All items shall be zinc-coated or galvanized in accordance with ASTM A153 or ASTM A123, as applicable. Contractor shall select the lift devices, and shall be responsible for their performance and for any damage resulting from the use of faulty or inferior devices. Lift devices shall not be visible on exposed faces of precast members. Provide a minimum four for each unit.
- E. Concrete reinforcement, lifting reinforcement, and concrete inserts and anchorage devices shall be placed and secured against movement as required.
- F. Concrete shall be placed and consolidated to shape, configuration, and dimensions indicated.
- G. Identification: Identify each precast unit, in a semi-permanent manner, at the precasting yard with respect to the final location. Locate such identification and make it of such material as to withstand wear during shipping and damage from the elements for a period of not less than one year. Protect and preserve identification marks and restore any identification which becomes damaged or partially obliterated.
  - 1. The Engineer reserves the right to reject any unit, and require replacement, if the identification becomes obliterated.
- H. Repair or replace any unit which does not conform to the dimensions or structural standards shown on the Contract Drawings or specified herein, and which is not suitable for use as determined by the Engineer.

**2.03 FABRICATION TOLERANCES**

- A. Fabricate precast units conforming to the maximum dimensional tolerances listed in the PCI Standards for precast concrete structures. Units shall be stored in such a way as to permit the Inspector access to all sides at all times.

**2.04 SOURCE QUALITY CONTROL**

- A. The Engineer will perform an inspection of precast concrete structures during the fabrication process at the manufacturing plant.
- B. The Contractor-employed independent testing laboratory or agency shall perform such inspections and tests as required to verify compliance with these Specifications, including the following testing: Concrete shall be tested for compressive strength specified in Section 03300, Cast-in-Place Concrete. A set of seven cylinders shall be prepared for every ten precast units, or fraction thereof, cast in any one day. Two cylinders shall be tested at 3 days, two cylinders at 7 days, two cylinders at 28 days, and one cylinder shall be retained for further testing as may be required. Cylinders shall be prepared and moist cured in accordance with ASTM C31, and tested in accordance with ASTM C39.

**PART 3 - EXECUTION**

**3.01 PREPARATION**

- A. Verify acceptability and location of supports to receive precast concrete structures. Examine all parts of the supporting structure and the conditions under which the precast units are to be erected and installed. Check bearing surfaces to determine that they are level and uniform.

**3.02 INSTALLATION**

- A. Perform excavation and backfill operations in accordance with Section 02300, Earthwork.
- B. Install precast concrete structures, including precast concrete field joints, in conformance with Caltrans Standard Specifications, Section 51-1.115, "Precast Members," as specified herein, and to the stages shown on the Contract Drawings.

**END OF SECTION**