

SECTION 034100 - STRUCTURAL PRECAST CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 specification sections, apply to work of this Section.

1.2 DESCRIPTION OF WORK

- A. Extent of structural precast concrete work is shown on drawings and in schedules.
- B. Related Work Specified Elsewhere:
 - 1. Section 042000 - Mortar.
 - 2. Section 079000 - Joint sealants.

1.3 QUALITY ASSURANCE

- A. Codes and Standards: Comply with provisions of following codes, specifications and standards, except as otherwise indicated:
 - 1. ACI 301 "Specifications for Structural Concrete for Buildings".
 - 2. ACI 318 "Building Code Requirements for Reinforced Concrete".
 - 3. Concrete Reinforcing Steel Institute, "Manual of Standard Practice".
 - 4. Prestressed Concrete Institute MNL 116, "Manual for Quality Control for Plants and Production of Precast Concrete Products".

1.4 SUBMITTALS

- A. General: Submit in accordance with Section 013300.
- B. See Section 013310 for Submittal Schedule.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver precast concrete units to project site in such quantities and at such times assure continuity of installation. Store units at project site to prevent cracking, distortion, staining, or other physical damage, and so that markings are visible. Lift and support units at designated lift points.
- B. Deliver anchorage items which are to be imbedded in other construction before start of such work. Provide setting diagrams, templates, instructions and directions as required for installation.
- C. Lift and support units only at designated points shown on Shop Drawings.

PART 2 - PRODUCTS

2.1 PRESTRESSING TENDONS

- A. Uncoated, 7-wire stress-relieved strand complying with ASTM A416, Grade 270.

2.2 CONCRETE MATERIALS

- A. Portland Cement: ASTM C150, Type I or III.
- B. Aggregates: ASTM C33, or C330.
- C. Water: Drinkable and free from foreign materials in amounts harmful to concrete and imbedded steel.

2.3 CONNECTION MATERIALS

- A. Steel Plates: Structural quality, hot-rolled carbon steel, ASTM A283, Grade C.
- B. Steel Shapes: ASTM A36.
- C. Anchor Bolts: ASTM A307, low-carbon steel bolts, regular hexagon nuts and carbon steel washers.
- D. Accessories: Provide clips, hangers, and other accessories required for installation of project units and for support of subsequent construction or finishes.

2.4 GROUT MATERIALS

- A. Cement Grout: Portland cement, ASTM C150, Type I, and clean, natural sand, ASTM C404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- B. Nonmetallic Shrinkage-Resistant Grout: Pre-mixed, nonmetallic, noncorrosive, nonstaining product containing selected silica sands, portland cement, shrinkage compensating agents, plasticizing and water reducing agents, complying with CRD-C621.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Welding: Perform welding in compliance with AAWS D1.1, including qualification of welders. Protect units from damage by field welding or cutting operations and provide noncombustible shield as required.
- B. Powder-Actuated Fasteners: Do not use powder-actuated fasteners for surface attachment of accessory items in precast prestressed unit, without prior approval of precast manufacturer.

- C. Installation Tolerances: Install precast units without exceeding following tolerance limits:
1. Variations from level or elevation: 1/4" in any 20' run; 1/2" in any 40' run; total plus or minus 1/2" at any location.
 2. Variation from position in plan: plus or minus 1/2" maximum at any location.
 3. Offsets in alignment of adjacent members at any joint: 1/16" in any 10' run; 1/4" maximum.
- D. Grouting Connections and Joints: After precast concrete units have been placed and secured, grout open spaces at connection and joints with cement grout or nonmetallic nonshrink grout, as follows:
1. Provide forms or other acceptable method to retain grout in place until sufficiently hard to support itself. Fill spaces 100% with grout material and compact until voids are filled and all bonding surfaces coated 100%.
 2. Place grout to finish smooth, plumb, and level with adjacent concrete surfaces. Keep grouted joints damp for not less than 24 hours after initial set. Promptly remove excess grout material from exposed surfaces before it hardens.

3.2 QUALITY CONTROL EVALUATIONS

- A. The Owner may employ a separate testing laboratory to evaluate precast manufacturer's quality control and testing methods.
- B. The precast manufacturer shall allow Owner's testing facility access to materials storage areas, concrete production equipment, and concrete placement and curing facilities. Cooperate with Owner's testing laboratory and provide samples of materials and concrete mixes as may be requested for additional testing and evaluation.
- C. Dimensional Tolerances:
1. Units having dimensions smaller or greater than required, and outside specified tolerance limits, will be subject to additional testing as herein specified.
 2. Precast units having dimensions greater than required will be rejected if appearance or function of the structure is adversely affected, or if larger dimensions interfere with other construction. Repair, or remove and replace, rejected units as required to meet construction conditions.
- D. Strength of Units: The strength of precast concrete units will be considered potentially deficient if manufacturing processes fail to comply with any requirements which may affect strength of precast units, including the following conditions:
1. Failure to meet compressive strength tests requirements.
 2. Reinforcement, and pretensioning and detensioning of tendons of prestressed concrete, not conforming to specified fabrication requirements.

3. Concrete curing and protection of precast units against extremes in temperature, not as specified.
 4. Precast units damaged during handling and erection.
- E. Testing Precast Units: When there is evidence that strength of precast concrete units does not meet specification requirements, the concrete testing service shall take cores drilled from hardened concrete for compressive strength determination, complying with ASTM C42 or as follows:
1. Take at least 3 representative cores from precast units of suspect strength, from locations directed by Architect.
 2. Test cores in an air-dry condition per ACI 318 if concrete will be dry during use of completed structure and in a saturated-surface-dry condition if concrete will be wet during use of completed structure.
 3. Strength of concrete for each series of cores will be considered satisfactory if their average compressive strength is at least 85% of 28-day design compressive strength.
 4. Test results will be made in writing on same day that tests are made, with copies to Architect, Contractor, and precast manufacturer. Include in test reports the project identification name and number, date, name of precast concrete manufacturer, name of concrete testing service, identification letter, name, and type of member(s) represented by core tests, design compressive strength, compression breaking strength and type of break (corrected for length-diameter ratio), direction of applied load to core with respect to horizontal plan of concrete as placed, and moisture condition of core at time of bearing.
- F. Patching: Where core test results are satisfactory and precast units are acceptable for use in work, fill cores solid with patching mortar, and finish to match adjacent concrete surfaces.
- G. Defective Work: Precast concrete units which do not conform to specified requirements, including strength, tolerances, and finishes shall be replaced with precast concrete units that meet requirements of this Section. Contractor shall also be responsible for cost of corrections to their work affected by or resulting from corrections to precast work.

END OF SECTION 034100