SECTION 03 40 00
PRECAST CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Pre-cast concrete, complete with required connecting and supporting devices.

1.2 REFERENCES

A. ACI 318: Building Code Requirements for Reinforced Concrete. This reference standard includes other ASTM material standards.
B. ASTM A 36: Standard Specification for Structural Steel.
C. ASTM C 478: Standard Specification for Precast Reinforced Concrete Manhole Sections.
D. ASTM C 857: Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.
E. ASTM C 858: Standard Specification for Underground Precast Concrete Utility Structures.
F. ASTM C 891: Standard Practice for Installation of Underground Precast Concrete Utility Structures.
G. AWS D1.1: Structural Welding Code Steel.
H. AWS D1.4: Structural Welding Code Reinforcing Steel.
I. PCI: Design Handbook.
J. PCI MNL-116: Quality Control and Assurance for Plant Production of Prestressed Concrete.
K. PCI MNL-117: Quality Control and Assurance for Plant Production of Architectural Precast Concrete.

1.3 DESIGN CRITERIA

A. Design structural precast concrete units, ACI 318 and PCI design handbook.
B. Design utility precast units, ASTM C 857 and C 858.
C. Under direct supervision of professional engineer who is fully experienced in design of units.
D. Design units to support required stripping and handling loads, live, dead and construction loads.
E. Design component connections to provide adjustment to accommodate misalignment of structure during installation.

1.4 SHOP DRAWINGS

A. Prepare shop drawings under seal of licensed professional.
B. Submit shop drawings, Section 01 33 00.
C. Indicate unit locations, unit identification marks, fabrication details, reinforcement, connection details, pertinent dimensions, and erection support points. Unit identification marks to appear on all manufactured units.
D. Do not proceed with fabrication until shop drawings have been accepted.

1.5 QUALITY ASSURANCE

A. Manufacture:

1. Prestressed: PCI certified.
2. Precast Concrete Units: PCI or NPCA certified
3. Precast Utility Structures and Pipe: ACPA certified.

B. Transporter: Acceptable to precast or prestressed product manufacturer.

C. Erector:
1. Prestressed: PCI certified.
2. Precast: Has 5 years minimum experience in erecting precast units.

D. Welders: Certified, AWS D1.1 and AWS D1.4.

1.6 **DELIVERY, STORAGE AND HANDLING**

A. Handle precast units in positions consistent with their shape and design. Lift and support only from support points indicated on shop drawings.

B. Embedded Lifting or Handling Devices: Capable of supporting units in positions anticipated during manufacture, storage, transportation, and erection.

C. Block and laterally brace units while stored at manufacturers. Provide lateral bracing that is sufficient to prevent bowing and warping that is clean, nonstaining, and will not inhibit uniform curing of exposed surfaces.

D. Provide edges of units with adequate protection to prevent staining, chipping, or spalling of concrete.

E. Unless otherwise approved in writing, do not deliver units to job site until required for installation.

PART 2 PRODUCTS

2.1 **CONCRETE**

A. Concrete for Above Ground Structures: 5000 psi minimum, Section 03 30 04 and ACI 318.

B. Concrete for Underground Structures: Class 4000 minimum, Section 03 30 04 and ASTM C 478 or ASTM C 858.

2.2 **ACCESSORIES**

A. Connecting and Supporting Devices: Steel, ASTM A 36.

B. Bolts, Nuts, and Washers: High-strength steel, Section 05 05 23.

C. Reinforcement: Grade 60 steel, Section 03 20 00.

2.3 **FABRICATION**

A. Maintain plant records and quality control program during production of structural precast concrete. Make records available to ENGINEER.

B. Use molds which are rigid and constructed of material that will result in uniform finished products.

C. If self consolidating concrete is NOT used, vibrate concrete to ensure proper consolidation, elimination of unintentional cold joints, and minimize entrapped air on surface.

D. Fabricate required connecting devices, plates, angles, items fit to steel framing members, bolts and accessories.
E. Ensure reinforcing steel, anchors, inserts, plates, angles, and other cast-in items are sufficiently embedded, anchored and property located.
F. Ensure finished surfaces of precast structural units are uniform.
G. Cure units under identical conditions to develop specified concrete quality, and minimize appearance blemishes such as non-uniformity, staining or surface cracking.

2.4 **DESIGN DEVIATIONS**

A. Deviation: Provide installation equivalent to basic intent without additional cost to OWNER. Deviations from exact required cross-section will be permitted only with approval.
B. Manufacturer's Proposed Design: Supported by complete design calculations and drawings. When requested, submit design calculations for review bearing seal and signature of professional engineer.

2.5 **OPENINGS**

A. Provide required openings, 6 inches or larger. If approved, smaller sizes may be field constructed by coring or sawing.

2.6 **FINISHES**

A. General: The required finish will be described in one of the following paragraphs. If no finish is indicated or selected by ENGINEER Standard.
B. Standard Finish: Produced in forms such as plastic or metal lined that impart a smooth finish to the concrete. Small surface holes, normal form joint marks, minor chips and spall are acceptable if approved. Major or unsightly imperfections, honeycomb or structural defects are not acceptable.
C. Commercial Finish: Produced in forms such as plywood or lumber that impart texture to concrete. Remove fins and large projections. Fill holes over 3/8 inch. Make faces true and well defined. Correct exposed ragged edges by rubbing or grinding.
D. Architectural Grade A Finish: Produced in forms such as plastic or metal lined that impart smooth finish to concrete. Fill holes over 1/4 inch in diameter with sand-cement paste. Grind smooth form offsets or fins over 1/8 inch. Coat with neat cement paste using float. After paste coat has dried, rub with burlap to remove loose particles.
E. Architectural Grade B Finish: Produced in forms such as plastic or metal lined that impart smooth finish to concrete. Fill holes over 1/4 inch in diameter with sand-cement paste. Grind smooth form offsets or fins over 1/8 inch.
F. Special Finishes: Sandblasting, acid washing, retarders or form liners as approved by ENGINEER. Special finishes require submittal of two 12 x 12 inch samples showing a representative color and texture to be used.
G. Painted Finishes: On concrete to be painted, use a form release agent acceptable to the paint manufacturer.

2.7 **REPAIR**

A. Repair of damaged units is acceptable if structural integrity or appearance is not impaired.

2.8 **ALLOWABLE TOLERANCES**

A. Length: Plus or minus 3/4 inch, or plus or minus 1/8 inch per 10 feet of length, whichever is greater, or as indicated.
B. End Squareness: 1/2 inch maximum.
C. Blockouts: 1 inch of centerline location indicated.

PART 3 EXECUTION

3.1 **INSTALLATION**

A. Do not install precast units until concrete has attained its design compressive strength.
B. Install members plumb, level, and in alignment within PCI MNL-116 or PCI MNL-117 and indicated limits of erection tolerances.
C. Clean weld marks or other marks, debris, or dirt from exposed surfaces of units.
D. Install underground utility precast units per ASTM C 891.

3.2 **PERFORMANCE REQUIREMENTS**

A. Conduct inspections, perform testing, and make repairs or replace unsatisfactory precast units as required.
B. Rejection: Units may be rejected for any one of the following.
   1. Exceeding specified installation tolerances.
   2. Damaged during construction operations.
   3. Exposed-to-view surfaces which develops surface deficiencies.
   4. Other defects as listed in PCI MNL-116 or PCI MNL-117.

END OF SECTION