



SECTION 034100 - PLANT-PRECAST STRUCTURAL CONCRETE PANELS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
 - 1. Precast, prestressed, insulated structural concrete panels.
- B. Related Work Specified Elsewhere:
 - Section 03 3000 – Cast-in-Place Concrete.
 - Section 05 1200 – Structural Steel Framing.
 - Section 05 5000 – Metal Fabrications.
 - Section 07 6200 – Sheet Metal Flashing and Trim.
 - Section 07 9200 – Joint Sealants: Perimeter joints with sealant and backing.
 - Section 09 9000 – Painting and Coating: Preparation of concrete surfaces beyond specified level of concrete finish required prior to painting.
- C. Work Furnished and Installed by others:
 - 1. Receivers or Reglets for flashing
 - 2. Elevator guides
 - 3. Steel required for bar joist bearing unless otherwise noted
 - 4. Deck angle, if required
 - 5. All loose steel and connections for beams where they attach to precast unless otherwise noted
 - 6. Hollow core plank, support steel, all connection steel, caulk and connections between precast wall panels and hollow core plank unless otherwise noted
 - 7. Any steel frames at openings. Not required for structural reasons. If needed for aesthetics, to be furnished and installed by others.
 - 8. Caulk between precast wall panels and adjacent materials

1.2 REFERENCES

- A. The publications listed below form a part of this specification to the extent referenced. Applicable sections of these publications are referenced within the text.
- B. AWS – American Welding Society
ASTM – ASTM International
PCI – Precast/Prestressed Concrete Institute.
ACI – American Concrete Institute

1.3 SUBMITTALS

- A. Submittal Procedures: Submit all submittals electronically in PDF format via email, unless otherwise specified.
- B. Shop Drawings:

1. Plans, elevations, and details indicating panel locations, design loads, construction (including welding requirements, finish, and openings etc.), identify product provided by the manufacturer.
 2. Shop drawings shall be signed and sealed by a Professional Engineer licensed in the jurisdiction in which the project is located.
- C. Product Design Criteria: Design calculations shall be performed by an engineer experienced in precast, prestressed concrete design. Design calculations, signed by a Professional Engineer licensed in the jurisdiction in which the project is located, shall be submitted upon request. Information shall include:
1. Dead, live, wind, and seismic loads as identified in Contract Documents and as required by applicable codes.
 2. Temporary bracing loads if required
- D. Test Reports: Test reports on concrete and other materials used in fabrication. Submittal is not required unless specifically requested, reports to be maintained reports on file with the manufacturer and available upon request.

1.4 **QUALITY ASSURANCE**

- A. Manufacturer's Qualifications: The manufacturer's precast concrete production facility shall be certified by PCI Plant Certification Program. Manufacturer shall have produced product similar to what is specified for a minimum of two years.
- B. Erector's Qualifications:
1. Regularly engaged for a minimum of five years in the erection of precast structural concrete similar to the requirements of this project.
 2. Erection crews shall be certified by PCI Field Certification Program prior to start of precast installation.
- C. Welders' Qualifications:
1. In accordance with AWS D1.1/1.1M and D1.4/1.4M.

1.5 **DELIVERY, STORAGE, AND HANDLING**

- A. Transport, handle, store, and protect products in compliance with manufacturer's recommendations.
- B. Support panels during shipment on shock-absorbing material.
- C. Store units with adequate bracing and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping or other physical damage.
1. Store units with dunnage across full width of each bearing point unless otherwise indicated.
 2. Place adequate dunnage of even thickness between each unit.
 3. Place stored units so identification marks are clearly visible and units can be inspected.
- D. Handle and transport units in a position consistent with their shape and design.
- E. Lift and support units only at designated points shown on Shop Drawings and/or per manufacturer's recommendations.

PART 2 - PRODUCTS

2.1 **PRECAST CONCRETE WALL PANEL MANUFACTURER**

- A. Fabcon, Savage, MN, Pleasanton, KS, Grove City, OH, or Mahanoy City, PA.

2.2 **WALL PANELS**

- A. Precast, Prestressed Insulated Sandwich Wall Panels and/or VersaCore Plus Green by Fabcon, as indicated on Drawings.

2.3 **DESIGN CRITERIA AND REGULATORY REQUIREMENTS**

- A. Comply with the design recommendations in PCI MNL 120. Comply with applicable building codes.
- B. Calculated Fire-Test-Response Characteristics: Provide precast concrete units with fire-resistance rating indicated as calculated according to PCI MNL 124 and acceptable to authorities having jurisdiction.

2.4 MATERIALS

- A. Portland Cement: ASTM C 150.
- B. Admixtures:
 - 1. Air-entraining admixtures: ASTM C 260.
 - 2. Water reducing, retarding, accelerating, high-range water reducing admixtures: ASTM C 494.
 - 3. Fly ash as required by the manufacturer.
- C. Aggregates: ASTM C33 or C 330.
- D. Water: Potable and free of foreign materials in amounts harmful to concrete, aggregate, or imbedded steel.
- E. Steel Reinforcing:
 - 1. Reinforcing Bars: Deformed Billet Steel: ASTM A 615, Deformed Rail Steel ASTM A616, Deformed Axle Steel ASTM A617, Deformed Low alloy Steel ASTM A706.
 - 2. Wire: Cold-Drawn Steel: ASTM A 82.
 - 3. Wire Fabric:
 - a. Welded Steel: ASTM A 185.
 - b. Welded Deformed Steel: ASTM A 497.
- F. Strand: Uncoated, 7-wire, stress relieved or low relaxation steel strand: ASTM A 416 (including supplement) Grade 250K or 270K.
- G. Anchors and Inserts: Structural steel, ASTM A 36, manufacturer's standard finish.
- H. Wythe Connectors: Polypropylene.
- I. Rigid Insulation: Expanded polystyrene board insulation and expanded polystyrene billets.
- J. Bearing Pads: High density plastic or hardboard shims or combination of both as recommended by precast concrete fabricator.
- K. Sand-Cement Grout:
 - 1. Portland Cement: ASTM C 150, Type I.
 - 2. Clean, natural sand: ASTM C 144 or ASTM C 404.
- L. Joint Sealant: Sikaflex 2c NS by Sika Corporation, (800) 933-7452 or (201) 933-8800.
 - 1. Color selection to be from manufacturer's standard palette and matched to adjacent precast concrete wall panel color, unless selected/approved by Owner's representative.

2.5 CONCRETE MIXES

- A. Mix design for the project, to provide concrete with the following properties:
 - 1. Compressive Strength: 7000 psi min. at 28 days.
 - 2. Release Strength: 3500 psi min.
 - 3. Calcium chloride, chloride ions, and/or other salts are not permitted.
 - 4. Entrained Air: 4 percent min. entrained air concrete at exposed surfaces. 9.5 percent +/- 1.5 percent on structural portion of panels.

2.6 GROUT MIXES

- A. Portland Cement and sand with minimum water required for placement and hydration.

2.7 FABRICATION

- A. Manufacturing procedures shall be in general compliance with PCI MNL 116.
- B. Manufacturing tolerances shall generally comply with PCI plant certification for structural products.
- C. Finishes: In general, finishes will comply with “Grade B’ per PCI MNL 116, 4th addition, Appendix C
 - 1. Standard Underside: (Formed finish).
 - a. Provide finish produced by casting against approved forms using good industry practice in cleaning forms, design of concrete mix, placing and curing.
 - b. Small surface holes caused by air bubbles, normal color variation, normal form joints, minor chips and spalls shall be tolerated. No major or unsightly imperfections, honeycombs or other defects shall be permitted unless they are nonstructural in nature and are patched per industry standards.
 - 2. Standard Top: (Exposed unformed surface finish):
 - a. Extent of finishes as indicated on the Drawings.
 - b. Provide finish resulting from vibratory screed and additional hand finishing.
 - c. Normal color variation, minor indentations, minor chips and spalls shall be permitted. No major imperfections, honeycombs or defects shall be permitted unless they are nonstructural in nature and are patched per industry standards.
 - d. Colors: Per design requirements
- D. Openings:
 - 1. Openings may be plant cast or sawn (either in plant or field). Plant fabricate openings 12 inches round or square and larger as indicated on the approved shop Drawings. Openings included at the time of manufacture will have a minimum of 3” of solid concrete at the perimeter. In cases where the insulation extends to the opening, window/door frames for insulated panels must be of sufficient width to cover insulation and allow anchorage into the structural portion. Openings smaller than 12 inches are to be field cut by the trade requiring the opening after the precast, prestressed products have been erected. All openings shall be approved by the architect/engineer and the precast manufacturer before drilling or cutting.
 - 2. For insulated panels, to minimize the risk of leaks, full depth head flashing is required at all openings. Penetrating the head flashing or failure to follow this detail may result in leaks, which are not the responsibility of the manufacturer.
- E. Patching:
 - 1. Maintain structural integrity.
 - 2. Conform to panel fabricator’s recommendations and directions.
- F. Fasteners: Cast in structural inserts, bolts, and plates as indicated on Shop Drawings.
- G. Insulation: Place full length of panel and space across panel width between reinforcing strands.
- H. Identify pickup points of precast structural concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings. Imprint or permanently mark casting date on each precast structural concrete unit on a surface that will not show in finished structure.
- I. Cure concrete according to requirements in PCI MNL 116 by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.

2.8 SOURCE QUALITY CONTROL

- A. Quality-Control Testing: In general compliance with testing provisions in PCI MNL 116, Manual for Quality Control for Plants and Production of Precast, Prestressed Concrete Products. Testing will be performed by manufacturer’s qualified personnel at the production facility.

PART 3 - EXECUTION

3.1 PREPARATION- Responsibilities of the General Contractor (GC) and/or Construction Manager (CM)

- A. Provide suitable access to and around building with proper drainage and firm, level bearing for hauling and erection equipment. Provide a stable, compacted, and drainable 40-foot wide all-weather aggregate surfacing, capable of accommodating up to 90,000 pounds gross weight, to remain in place throughout panel erection. Coordinate with precast manufacturer for location. All equipment, including but not limited to cranes, trucks, forklifts and manlifts, must be capable of moving under their own power in an unobstructed manner so as not to cause erection delays for the duration of the erector's work on site.
- B. Provide true, level bearing surfaces on field placed bearing walls and other field placed bearing structures. Ensure that all foundations are completed, properly cured and ready to receive precast per the approved erections sequence and durations. Maintain bearing surface in a "clean" condition until precast is installed.
- C. Excavating is recognized as one of the most hazardous construction operations. GC shall meet all requirements set forth by OSHA in Subpart P, Excavations, of [29 CFR 1926.650](#), [29 CFR 1926.651](#), and [29 CFR 1926.652](#). This includes meeting the conditions prior to a panel being set as well as after the panel is set as this may cause hazards due to a cave in against a set panel.
- D. Place and align anchor bolts, plates or dowels in column footings, grade beams and other field placed bearing structures.
- E. Establish and maintain control points and benchmarks in an undisturbed condition for the use of the erector until final completion and acceptance of the project. Control points shall consist of permanent pins inserted into the top of the footing by the Surveyor of Record at all building corners at a maximum of 75' intervals, along the footing foundation and at the tops and bottoms of all steps in the foundation. Benchmark finished floor elevation markers are required to be permanently established within the building pad.
- F. Remove or de-energize all power lines per OSHA 1926.1410 guidelines, mark underground utilities, secure permits, including those for airport access, e.g. FAA permit for crane clearance.

3.2 **INSTALLATION**

- A. Installation of precast, prestressed concrete shall be performed by the manufacturer or manufacturer's approved erector under the PCI Certified Erector Program.
 - a. Members shall be lifted by means of suitable lifting devices at points provided by the manufacturer.
 - b. Temporary shoring and bracing, if necessary, as shown on the approved shop drawings, shall comply with the manufacturer's recommendations.
- B. Seal joints between the precast panels and install fire stopping material as shown, if required, on the approved shop drawings in joints. Install in compliance with manufacturer's instructions and recommendations.

- A. **Field Welding:** Perform field welding by qualified welders using equipment and materials in accordance with AWS D1.1/1.1M and D1.4/1.4M.
- B. Round or square openings less than 12 inches in size, round or square, shall be located and field drilled or cut by the trade requiring the opening after the panels have been erected unless indicated otherwise on the approved shop drawings. Coordinate with the precast concrete panel fabricator to locate field cut openings to avoid unnecessary cutting of panel reinforcement. Field cut openings shall be verified by the manufacturer to maintain structural integrity of the work.

3.3 **ALIGNMENT**

- A. Erect precast structural concrete units level, plumb, square, true, and in alignment in general compliance with the erection tolerances of PCI MNL 135. Members shall be properly aligned and leveled as required by the approved shop drawings.
- B. Variations between adjacent slab members shall be reasonably leveled out by jacking, loading, or other industry standard method recommended by fabricator.

3.4 **FIELD QUALITY CONTROL**

- A. Inspect all installed precast panels for conformance with approved shop drawings and industry standards. Field quality control testing and inspection shall be at the discretion and expense of the GC or CM and/or Owner as necessary to assure compliance with Contract requirements.
- B. Manufacturer to cooperate with GC or CM and/or Owner in any discretionary testing and inspection.

3.5 **CLEANING AND PROTECTION**

- A. Comply with manufacturer's instructions and recommendations for cleaning precast concrete panels when panel erection is complete.
- B. Following installation, the GC and/or CM shall be responsible for protecting the product from the elements to prevent damage, discoloration and/or moisture infiltration.

END OF SPECIFICATION