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SECTION 03 41 00 - PRECAST STRUCTURAL CONCRETE

Fabcon VersaCore Pro Wall Panels

Part I — General

1.1 Summary

A. Section Includes
   1. Precast, prestressed, insulated structural concrete panels.

B. Related Work Specified Elsewhere
   Section 03 30 00—Cast-in-Place Concrete.
   Section 05 12 00—Structural Steel Framing.
   Section 05 50 00—Metal Fabrications.
   Section 07 62 00— Sheet Metal Flashing and Trim.
   Section 07 92 00—Joint Sealants: *Perimeter joints with sealant and backing.*
   Section 09 90 00—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, 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.

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(1.3 Submittals, continued. . .)

B. Shop Drawings
   1. Plans, elevations, and details indicating panel locations, design loads, and 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, seismic, and other applicable loads as identified in Contract Documents and as required by applicable codes and any additional customer requirements.
   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 Qualification
   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, & Handling

A. Transport, handle, store, and protect products in compliance with manufacturer's recommendations.

B. Support panels during shipment with appropriate dunnage materials and locations.

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.
   4. Handle and transport units in a position consistent with their shape and design.
   5. Lift and support units only at designated points shown on Shop Drawings and/or per manufacturer's recommendations.

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Part II — Products

2.1 Precast Concrete Wall Panel Manufacturer

A. Fabcon
Savage, MN; Pleasanton, KS; Grove City, OH; or Mahanoy City, PA, Selkirk, NY; Charlestown, IN; Trenton, MI; or Grand Rapids, MI.

2.2 Wall Panels

A. Precast, Prestressed Insulated VersaCore Pro Wall Panels by Fabcon.

2.3 Design Criteria & 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 C595 or C150.

B. Other Cementitious Materials
1. Optional: Slag cement | ASTM C989.
2. Optional supplementary cementitious materials (SCM): Carbonate microfine | ODOT 705.27 Modified Type C

C. Aggregates | ASTM C33 as modified by PCI MNL 116

D. Water
Potable or 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.

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(2.4 Materials, continued. . .)

G. Anchors and Inserts
Structural steel, ASTM A 36, manufacturer's standard finish.

H. Rigid Insulation
Expanded graphite polystyrene (GPS) billets and drop-ins. Additional GPS board insulation if VersaCore Pro Sandwich walls panels are specified.

I. Bearing Pads
High density plastic or hardboard shims or combination of both as recommended by precast concrete fabricator.

J. Sand-Cement Grout
1. Portland Cement | ASTM C 150, Type I or ASTM C595.
2. Clean, natural sand | ASTM C 144 or ASTM C 404.

K. Joint Sealant
Joint sealant shall be a polyurethane or hybrid polyurethane-based, elastomeric joint sealant designed for use in precast concrete panel joints. Sealant shall exhibit excellent adhesion to concrete substrates, accommodate dynamic joint movement of ±25% or greater, and maintain elasticity under temperature cycling. Product shall comply with ASTM C920, Type S or M, Grade NS, Class 25 or higher, and be resistant to UV exposure, moisture, and long-term weathering.

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, up to 9.5 percent +/- 1.5% 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.

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(2.7 Fabrication, continued. . .)

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/or 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
   2. or square and larger as indicated on the approved Shop Drawings. Openings included at the time of manufacture will have a minimum of 3 inches 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.
   3. 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 unless otherwise noted.

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.

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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 III — Execution

3.1 Examination

Site Readiness:

1. Site must be free of obstructions and allow safe and proper access for precast erection. Precast erector shall review site conditions; however, the General Contractor and/or Construction Manager remains responsible for providing and maintaining site conditions that meet this Section.
2. A Site Readiness Assessment (SRA) will be completed prior to mobilization. Any deficiencies noted in the SRA must be corrected prior to work commencing. If deficiencies are identified after SRA approval and/or work commencing, precast operations may be suspended until corrected.
3. It is the responsibility of the General Contractor and/or Construction Manager to ensure all site readiness requirements have been met and maintained for the entire duration of precast erection activities. Any changes to site conditions and/or plan must be reviewed and accepted by the Precast erector.

3.2 Preparation

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

A. General: Provide a safe, stable, and unobstructed work environment that supports the approved erection sequence and schedule.

B. Provide and maintain suitable access to and around building.
   1. Suitable access shall include a compacted all-weather aggregate surface with proper drainage and firm, level bearing for hauling and erection equipment. Access shall remain in this condition until erection is complete.
   2. Access roads shall be a minimum of 60 feet wide and capable of accommodating up to 90,000 pounds gross weight, or as otherwise required by the precast erector's crane/haul plan.
   3. All equipment, including but not limited to cranes, trucks, forklifts, and manlifts, must be capable of moving under their own power on stabilized surfaces in an unobstructed manner.
   4. Access location shall be coordinated with precast erector to align with established erection sequence.

C. Provide true, level bearing surfaces on field placed bearing walls and other field placed bearing structures.
   1. All cast-in-place concrete foundations supporting precast shall be completed and shall have attained the minimum allowable design compressive strength as required by the Contract Documents and verified by the responsible party's testing/inspection program.
   2. Supporting steel or other structures shall be structurally ready to receive loads from precast concrete members.

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(3.2 Preparation, continued. . .)

3. Bearing surfaces and support structures shall be completed in a manner that allows precast erection to follow the approved erection sequence.
4. Bearing surfaces and support structures shall be maintained in a clean condition until precast has been installed.

D. Ensure all excavations meet the requirements set forth by OSHA Subpart P, Excavations. This includes but is not limited to 29 CFR 1926.650, 29 CFR 1926.651, and 29 CFR 1926.652. Requirements shall be met and maintained prior to, during, and after precast panel erection.

E. Place and align anchor bolts, plates, dowels, and/or other embedded items in column footings, grade beams and other field placed bearing structures.

F. 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.
1. 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-ft. intervals, along the footing foundation and at the tops and bottoms of all steps in the foundation.
2. Benchmark finished floor elevation markers are required to be permanently established within the building pad.

G. Remove, relocate, or de-energize all power lines per OSHA 1926.1410 requirements.

H. Locate and clearly mark all underground utilities prior to precast mobilization.

I. Obtain all required permits.
1. Includes all permits required due to proximity of Airports and Railroads, e.g. FAA permit for crane clearance.

3.2 Installation

A. Installation of precast, prestressed concrete shall be performed by the precast manufacturer or manufacturer's approved erector.
1. Approved erectors shall be a PCI Certified Erector and in good standing with PCI.

B. Precast members shall be lifted by means of suitable lifting devices at points provided by the precast manufacturer.

C. Temporary shoring and bracing, if necessary, as shown on the approved Shop Drawings, shall be installed and comply with the manufacturer's recommendations.

D. Joint Sealant
Precast to Precast joints shall be properly cleaned and sealed following the Approved precast Shop Drawings. Sealant material shall be installed in compliance with approved manufacturer's recommendations.

1. If required, fire stopping material shall be installed as shown on the Approved precast Shop Drawings. Installation shall comply with the approved manufacturer's recommendations.

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(3.2 Installation, continued. . .)

E. Field Welding
Field welding shall be performed by qualified welders using equipment and materials in accordance with AWS D1.1/1.1M and D1.4/1.4M.

F. Grouting
Grouting shall be installed following the Approved precast Shop Drawings. Installation shall comply with the approved grout material manufacturer's recommendations.
1. General Contractor and/or Construction Manager shall provide temporary enclosures, heat, and weather protection necessary to maintain grout temperatures in accordance with manufacturer and ACI requirements.

G. Openings
Openings less than 12 inches in size, round or square, shall be located and field cut or drilled by the trade requiring the opening, unless indicated otherwise on the Approved precast Shop Drawings.
1. All field cut or drilled opening locations shall be coordinated and verified with the precast manufacturer prior to any panel modification. Field cutting/drilling shall not be performed without confirmation from the precast manufacturer that reinforcement and/or embedded items will not be compromised.
2. Field cut or drilled openings shall be completed after the panels have been erected.

3.3 Alignment

A. Erect precast structural concrete units level, plumb, square, true, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 135. Members shall be properly aligned and leveled as required by the Approved precast Shop Drawings.

3.4 Field Quality Control

A. Precast erector shall inspect all installed precast panels for conformance with Approved precast Shop Drawings and applicable industry standards.

B. Special Inspections and Testing
It shall be the General Contractor and/or Construction Manager's responsibility to engage a qualified testing and special inspection agency to perform field tests and inspections as required in Contract documents.
1. Precast manufacturer and erector shall cooperate with General Contractor and/or Construction Manager in any required testing and special inspections. Copies of required inspection reports shall be made available to the precast manufacturer/erector upon request.

3.5 Repairs

A. Minor chips, spalls, cracks, and other damage that occurred during shipping and/or installation activities shall be repaired on site by the precast erector.

B. Repairs shall be made following the precast manufacturer's recommendations and industry standards.

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(3.5 Repairs, continued. . .)

C. After installation and repairs have been completed, any further damage requiring repair work shall be the responsibility of the General Contractor and/or Construction Manager.

3.6 Closeout / Punch List

A. A joint precast punch list walk-through shall be conducted following completion of precast erection and initial repairs.

B. Punch list items shall be limited to conditions that do not conform to the Approved precast Shop Drawings, specified finish grade, or applicable PCI standards.

C. Precast scope of work shall be considered substantially complete upon completion of documented punch list items identified during the joint walk-through.

D. Damage occurring after completion of erection and documented punch list review shall be the responsibility of the General Contractor and/or Construction Manager.

3.7 Cleaning & Protection

E. Any cleaning of precast wall panels shall comply with the precast manufacturer's instructions and recommendations.

F. Following installation, the General Contractor and/or Construction Manager shall be responsible for protecting the precast product from the elements to prevent damage, discoloration, and/or moisture infiltration.

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