# SECTION 034130 - PRECAST PRESTRESSED HOLLOWCORE SLAB UNITS

## PART 1 - GENERAL

### 1.1 RELATED DOCUMENTS

A. Drawing and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

### 1.2 SUMMARY

A. This Section includes:

1. Providing openings in units to accommodate the work under this and other Sections and building into the units such as sleeves, anchor bolts and inserts required to be embedded in the units under this and other sections.
2. Notify other disciplines in advance of the precasting to provide them with sufficient time to advise of item required in their work that must be installed in the units.

B. Furnish all labor, materials, equipment and incidentals required to provide precast prestressed hollow slab units as shown and specified.

C. Related Sections:

1. Section 033000 - "Cast-in-Place Concrete" for concrete topping and placing connection anchors in concrete.
2. Section 051200 - "Structural Steel Framing" for furnishing and installing connections attached to structural-steel framing.
3. Section 055000 - "Metal Fabrications" for kickers and other miscellaneous steel shapes.
4. Section 078443 "Joint Firestopping" for firestopping vertical joints between fire-rated precast structural concrete wall panels.
5. Section 079200 - "Joint Sealants" for elastomeric joint sealants and sealant backings.

### 1.3 PERFORMANCE REQUIREMENTS

A. Design: Design units to support the superimposed loads shown or specified, in addition to the dead weight load of the units and construction loads (including piping and equipment loading, and structural topping loading), in accordance with the 2014 Indiana Building Code.

### 1.4 SUBMITTALS

A. Shop Drawings:

1. Include member locations, plans, elevations, dimensions, shapes and sections, openings, support conditions, and types of reinforcement, including special reinforcement.
2. Detail fabrication and installation of precast structural concrete units, including connections at member ends and to adjoining construction.
3. Indicate joints, reveals, drips, chamfers, and extent and location of each surface finish.
4. Indicate separate face and backup mixture locations and thicknesses.
5. Indicate type, size, and length of welded connections by AWS standard symbols.
6. Detail loose and cast-in hardware, lifting and erection inserts, connections, and joints.
7. Indicate locations, tolerances, and details of anchorage devices to be embedded in or attached to structure or other construction.
8. Include and locate openings larger than 10-inches. Where additional structural support is required, include header design.
9. Indicate location of each precast structural concrete unit by same identification mark placed on panel.
10. Indicate relationship of precast structural concrete units to adjacent materials.
11. Indicate locations, dimensions, and details of thin-brick units, including corner units and special shapes, and joint treatment.
12. Indicate locations, dimensions, and details of stone facings, anchors, and joint widths.
13. Indicate estimated camber for precast floor slabs with concrete toppings.
14. Indicate shim sizes and grouting sequence.
15. If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and Shop Drawings. Do not adversely affect the appearance, durability, or strength of units when modifying details or materials and maintain the general design concept.

B. Delegated-Design Submittal: For precast structural concrete indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Show precast structural concrete unit types, connections, types of reinforcement, including special reinforcement, and concrete cover on reinforcement. Indicate location, type, magnitude, and direction of loads imposed on the building structural frame from precast structural concrete.

C. Product Data:

1. Manufacturer's standard and special loading chart data for span and loading conditions required.
2. Submit certificates of material conformance with Specifications.
3. Submit manufacturer's literature and installation instructions.

D. Quality Assurance/Control Submittals:

1. Test Reports: Submit copies of all concrete cylinder test reports.

2. Certification Program: Manufacturer to participate in and furnish evidence to the OWNER of plant certification program specified in PCI MNL-116.
3. Manufacturer's Instructions: Submit all conditions at openings, including size, location, topping and grout details, fasteners, and header locations and dimensions.

1.5 QUALITY ASSURANCE

A. Fabricator Qualifications: A firm that assumes responsibility for engineering precast structural concrete units to comply with performance requirements. Responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

1. Designated as a PCI-certified plant as follows:

a. Group C, Category C2 – Prestressed Hollowcore and Repetitively Produced Products.

2. Installer Qualifications: A precast concrete erector qualified and designated by PCI's Certificate of Compliance, to erect Category S1 – Simple Structural Systems.

B. Regulatory Requirements:

1. Comply with ACI 318, PCI MNL 116, and PCI Design Handbook.

1.6 DELIVERY, STORAGE AND HANDLING

A. Comply with the following:

1. Transport and handle precast concrete slabs with proper equipment to protect units from dirt and damage.
2. Handle by means of lifting inserts, or slings.
3. Store units off ground and on firm surfaces to avoid warping and cracking.
4. Protect units from damage and discoloration.
5. Stack so that lifting devices are accessible and undamaged.
6. Separate stacked members by battens across full width.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Provide one the following:

1. Flexicore Company, Inc.
2. Hollowcore Midwest, LLC
3. Fabcon Precast
4. Gate Precast Concrete

5. High Concrete Group, LLC
6. Kerkstra Precast, Inc.
7. Coreslab Structures, Inc.
8. ATMI Precast
9. International Precast Solutions, LLC
10. Or approved equal.

## 2.2 REINFORCING MATERIALS

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.

C. Steel Bar Mats: ASTM A 184/A 184M, fabricated from ASTM A 615/A 615M, Grade 60, deformed bars, assembled with clips.

D. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from wire into flat sheets.

1. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.
2. Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 116.

## 2.3 CONCRETE MATERIALS

A. Concrete:

B. Portland Cement: Conform to ASTM C150, Type III.

C. Aggregate: Conform to ASTM C33, for fine to coarse gradation.

D. Chemical Admixtures:

1. Comply with: ASTM C494.
2. Calcium chloride shall not be used.

E. Water: Free from foreign materials in amount harmful to concrete.

## 2.4 PRESTRESSING STRANDS

A. Uncoated, 7-wire, low-relaxation strands conforming to ASTM A416, Grade 250 or 270.

## 2.5 BEARING PADS

A. Non-staining pressed (60 or 70 Durometer hardness) neoprene with thickness as indicated on Drawings of plastic with a compressive strength or 8,000 psi minimum, and negligible cold flow characteristics.

2.6 WELD INSERTS

A. Weld inserts, anchors, and anchor plates: To remain as shown and as required for anchoring slabs to supports.

2.7 HEADERS

A. Required to safely carry design loads.

B. Fabricated of steel conforming to ASTM A36.

C. Galvanized as specified in Section 055000 "Metal Fabrications".

2.8 CONCRETE MIXES

A. Mix Design: In accordance with ACI 211.3 or ACI 211.1, 5000 psi concrete at 28 days.

B. Measurements of concrete mix materials shall be within the following limits:

1. Cement: +/- 1%
2. Water: +/- 1%
3. Fine aggregate: +/- 2%
4. Coarse Aggregate: +/- 2%
5. Admixtures: +/- 3%

2.9 FABRICATION

A. Shop Assembly:

1. Type: Machine made, precast prestressed concrete units with open voids running the full length of slabs, produced under a rigid factory-inspected process acceptable to the ARCHITECT.
2. Furnish units, which are free of voids and honeycomb, with straight true edges and surfaces.

a. Provide units of a uniform color and free from stains or discoloration.
b. Top surface to have a float finish or machine finish free from holes if no structural topping is to be applied, and broom finish if structural topping is to be applied.

3. Pretension prestressing strands by either a dead weight system or a single strand jacking system.

    a. Mark strands for slippage, and if slippage occurs, detention and restress strand.
    b. Check tension of strand to insure accurate results.

4. Release strands when concrete reaches a minimum strength of 3,000 psi, or greater as required by design.
5. Adequately reinforce slab units to resist all transporting and handling stresses.
6. Include cast-in weld plates where required for anchorage or lateral bracing to structural steel members.
7. Identifications:

    a. Provide permanent markings as shown on the Shop Drawings.
    b. Markings not to show in the finished work.

8. Provide solid, monolithic precast slab units where shown to be an integral part of hollow slab unit system. Design and fabricate solid units to the dimensions and details shown, and as specified for hollow slab units.

9. Provide headers of structural steel shapes for openings larger than one slab width in accordance with hollow slab unit manufacturer's recommendations.
10. Units may be wet or steam cured at atmospheric pressure. If steam cured, conform to the requirements of ACI 517.2R.

## 2.10 FABRICATION TOLERANCES

A. Fabricate units to comply with the following tolerances:

1. Length: +/- 1/2- inch
2. Width: +/- 1/4-inch
3. Depth: +/- 1/4-inch
4. Position of weld plates: +/- 1/2-inch

## 2.11 INTERIOR FINISHES

A. Finish exposed back surfaces of architectural precast concrete units with smooth, two-pass steel-trowel finish.

## 2.12 SOURCE QUALITY CONTROL

A. Tests: Make cylinder tests of concrete quality in accordance with ASTM C192, for each mix design, for each day of production, or for each 100 cubic yards of concrete.

PART 3- EXECUTION

3.1 EXAMINATION

A. Site Verification of Conditions:

1. Examine the areas and conditions under which hollow slab units are to be installed.
2. Notify the CONSTRUCTION MANAGER in writing of conditions detrimental to the proper and timely completion of the work.
3. Do not proceed with the work until unsatisfactory conditions have been corrected.

B. Units not meeting the fabrication requirements, having any dimension smaller or greater than required, or that are outside the specified tolerance limits, will be rejected if the appearance, function, or structural integrity of the structure is adversely affected.

3.2 INSTALLATION

A. Lift, place, and secure hollow slab units in accordance with manufacturer's printed instructions and reviewed Shop Drawings.

B. Keep units tight and perpendicular to bearing supports.

C. Do not install hollow slab units until supporting members are in place and secured.

D. If any units rest on masonry block lintels, assure that voids in lintels are filled with concrete.

E. Follow erection procedures and sequence of erection as recommended by hollow slab unit manufacturer.

F. Differential camber between adjacent members of the same design, 1/4-inch per 10 feet but not greater than 1/2-inch over the total length.

G. Level slabs accurately or set to uniform slope as shown:

1. Bearing Surface:

a. Use bearing pads where units set on masonry.
b. Set slabs on solid, level bearings, with bearing surface of slab units not less than 3-inches at steel supports and not less than 4-inches at other supports unless otherwise acceptable to the CONSTRUCTION MANAGER.

2. Align and level to approved tolerance by methods, procedures, and equipment as recommended by the hollow slab unit manufacturer.
3. Vertical Alignment:

a. Where adjacent units are not in vertical alignment due to camber or other reason, provide mortar fill on lower unit to create a smooth transitional surface for the application of insulation.
b. Slope of fill, measured perpendicular to side joints, shall not be steeper than 1/8-inch per foot.

H. Cutting Holes:

1. Do not cut holes or install sleeves larger than size permitted by hollow slab unit manufacturer for pipe, conduits, duct or other penetrations after fabrication, except as otherwise shown or specified.
2. Do not cut reinforcing or pre-stressing strands without approval of manufacturer and as acceptable to the CONSTRUCTION MANAGER.
3. Field cut holes for openings that do not disturb pre-stressing strands in accordance with hollow slab unit manufacturer's instructions, unless otherwise shown or specified.

I. Weld inserts in slab units to bearing surfaces, as shown and specified.

J. Grouting Joints:

1. Clean joints before grouting.
2. Grout: One-part Portland cement to 2 1/2-parts sand.
3. Fill joints between units with grout.
4. Remove grout that seeped through to ceiling below before grout hardens to allow for caulking.

K. Caulk ceiling joints per Section 079200 "Joint Sealants".

3.3 REPAIR/RESTORATION

A. Repair damaged exposed surfaces. Leave units in a condition acceptable to the CONSTRUCTION MANAGER and ready to receive subsequent work.

END OF SECTION 034130