034500 – ARCHITECTURAL PRECAST CONCRETE

A. Included: Insulated architectural precast concrete with light acid etched finish matching appearance of limestone and thin brick facings as specified herein.

B. Design Requirements:

1. Delegated Design: Engage a qualified professional engineer, to design architectural precast concrete units including thin brick facing system.

2. Design Standards: Comply with ACI 318 and design recommendations of PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of architectural precast concrete units indicated.

3. Calculated Fire-Test-Response Characteristics: Provide architectural precast concrete units with fire-resistance rating indicated as calculated according to ACI 216.1 and acceptable to authorities having jurisdiction.

4. Dead Loads: Architectural precast concrete panel units and glazed aluminum windows in the architectural precast concrete panel units.

5. Live Loads: Refer to structural requirements.

6. Rain, Wind and Snow Loads: Architectural precast concrete panel units and their method of attachment to building structure and supports shall be designed to withstand rain, wind and snow loads as set forth by the applicable local building code, latest edition and ASCE/SEI 7 for geographical location of the Project site. Special care shall also be taken to identify and design for any situation not clearly defined in the design requirements where the Contractor believes the geometry of the building may cause increased wind, rain and build-up loads due to vortex or eddy conditions.

7. Seismic Loads: Architectural precast concrete panel units and attachments to other work, shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 for geographical location of the Project site.

8. Design architectural precast concrete units, and connections to maintain clearances at openings, to allow for fabrication and construction tolerances, to accommodate live-load deflection, shrinkage and creep of primary building structure, and other building movements including but not limited to; upward and downward movement of the building structure, overall building drift and inter-story building drift.

9. Reinforcement shall be designed to withstand forces imposed during shipment, as well as the specified wind loads.

10. Thermal Movements: Provide for in-plane thermal movements resulting from annual ambient temperature changes of 120 deg F.

11. Window Washing Equipment: Design architectural precast concrete panel units supporting window washing system indicated to resist pull-out and horizontal shear forces transmitted from window washing equipment.

12. Thermal Resistance: Design architectural precast concrete panel units with integral continuous thermal insulation so that the architectural precast concrete panel units have a minimum thermal resistance R-value of R17.2. Fabricate architectural precast concrete panel units using glass-fiber
and vinyl-ester polymer thermal break type connectors or polypropylene pin connectors manufactured to connect exterior and interior wythes of the architectural precast concrete panels.

C. Field Water Testing:

1. Typical areas of work of this section shall be checked for penetration in accordance with AAMA Standard 501.2-83. Architect will designate the areas of the completed work not less than two column bays in width and two stories in height to be checked. Architect shall witness all tests. Contractor shall be required to perform six (6) initially successful water tests.

D. Delegated Design Certification: Submit written certification prepared and sealed by a registered Structural Engineer licensed in the State of the project site, verifying the ability of members, assemblies, and connections to support the loads specified.

E. Quality Assurance:

1. Fabricator Qualifications: A firm that complies with the following requirements and is experienced in producing architectural precast concrete panel units similar to those indicated for this Project with a record of successful in-service performance.
   a. Assumes responsibility for engineering architectural precast concrete panel units to comply with performance requirements. This responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a delegated design qualified professional engineer.
   b. Professional Engineer Qualifications: A professional engineer who is licensed in the jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of architectural precast concrete that are similar to those indicated for this Project in material, design, and extent.
   c. Participates in PCI's plant certification program at time of bidding and is designated a PCI-certified plant for Group A, Category A1 - Architectural Cladding and Load Bearing Units or participates in APA's "Plant Certification Program for Production of Architectural Precast Concrete Products" and is designated an APA-certified plant.
   d. Has sufficient production capacity to produce required units without delaying the Work.
   e. Certification shall be maintained throughout the production of the precast concrete units. Production shall immediately stop if at any time the fabricator's certification is revoked, regardless of the status of completion of contracted work. Production will not be allowed to re-start until the necessary corrections are made and certification has been re-established. In the event certification(s) cannot be re-established in a timely manner, causing project delays, the fabricator, at no additional cost, will contract out the remainder of the units to be manufactured at a PCI certified plant.
   f. Is registered with and approved by authorities having jurisdiction.

2. Erector Qualifications: A precast concrete erector qualified and designated by PCI's Certificate of Compliance to erect Category A (Architectural Systems) for non-load-bearing members and who has retained a "PCI-Certified Field Auditor" to conduct a field audit of a project in same category as this Project before erection of precast concrete and who can produce an Erectors' Post-Audit Declaration.
3. Erector Certification: A precast concrete erector with erecting organization and all erecting crews certified and designated, prior to beginning work at project site, by PCI's Certificate of Compliance to erect Category A (Architectural Systems) for non-load-bearing members.

4. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 117, "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products."


6. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM C1077 and ASTM E329 for testing to comply with PCI MNL 117, "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products."

F. Manufacturers:

1. Basis of Design: Subject to compliance with requirements, provide Architectural Precast Concrete Panels with Exposed Concrete Texture Finish as indicated, or by available manufacturers offering equivalent products that may be incorporated into the Work include but are not limited to the following:
   a. Lombard Architectural Precast Company, Alsip, Illinois
   b. International Concrete Products, Germantown, WI
   c. Gate Precast Company, Winchester, Kentucky.

G. Products:

1. Regional Materials: Architectural precast concrete shall be manufactured from aggregates and cement that have been extracted or recovered, as well as manufactured, within 500 miles of Project site.

2. Concrete Mix:
   a. All concrete used in precast members to have a minimum 28 day compressive strength of 5000 psi.

3. Portland Cement: ASTM C159, Type I.

4. Coarse Aggregate: Type and color as selected by the Architect.


6. Admixtures:
   a. Water-reducing and/or retarding admixtures (ASTM C 494 compatible Type A or D as required).
   b. Air entraining admixtures (ASTM C 260) 5 percent entrained air (plus or minus one percent).

7. Water: ASTM C 94/C 94M. Clean, potable, water from uncontaminated water mains, free of organic matter, silt and sediments, chlorides (salt), sulfides and oils, with pH value in the basic range of 7 to 9 and complying with chemical limits of PCI MNL 117.

7. Reinforcement: ASTM A 615, Grade 60.
   b. All bars and fabric shall be hot dipped galvanized.

8. Steel supports, braces, metal anchors, and clips required to attach precast into place, including items cast into architectural precast concrete shall comply with ASTM A 36. Items cast into the architectural precast concrete, except weld plates shall be hot dipped galvanized. Hot dip galvanizing shall comply with ASTM A 123/A 123M.

9. Molds and Form Liners:
   a. Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that will provide continuous and true precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and suitable for producing required finishes. Furnish with manufacturer's recommended liquid-release agent that will not bond with, stain, or adversely affect architectural precast concrete surfaces and will not impair subsequent surface or joint treatments of architectural precast concrete.
   b. Form Liners: Units of face design, texture, arrangement, and configuration for incorporating thin brick facings and joints having concave face surface simulating masonry mortar joints. Furnish with manufacturer's recommended liquid-release agent that will not bond with, stain, or adversely affect architectural precast concrete surfaces and will not impair subsequent surface or joint treatments of architectural precast concrete.

10. Bearing Pads: Provide elastomeric type, or random-oriented, fiber-reinforced elastomeric type, or cotton-duck-fabric-reinforced elastomeric type, or frictionless bonded type, or high-density, non-leaching, multi-monomer plastic type bearing pads for architectural precast concrete units as recommended by the architectural precast concrete fabricator to suit applications.

11. Accessories:
   a. Supports: Suspend reinforcement from back of mold or use plastic or plastic tipped (color to match architectural finished surfaces) bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 117.
   b. Reglets: Stainless steel, Type 304, felt or fiber filled, or with face opening of slots covered.
   c. Erection Accessories: Provide clips, hangers, high-density plastic or steel shims, and other accessories required to install architectural precast concrete units.
d. Welding Electrodes: Comply with AWS standards for steel type and/or alloy being welded.

e. Water Repellent Coating: Clear, water based, VOC compliant, minimum 20% alkylalkoxysilane or isobutyltrialkoxysilane type penetrating water repellent coating that protects against moisture and chloride intrusion of concrete and also compatible with thin brick facings specified herein, equivalent to MasterProtect H 200 by BASF Construction Chemicals LLC - Building Systems, or equivalent product by Euclid Chemical Company, or equivalent product by Dayton Superior Corporation.

12. Grout Materials:

a. Non-metallic, Non-shrink Grout: Packaged, non-metallic, non-corrosive, non-staining grout containing selected silica sands, Portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, Grade A for drypack and Grades B and C for flowable grout and of consistency suitable for application within a 30-minute working time. Water-soluble chloride ion content less than 0.06 percent by weight of cement when tested according to ASTM C 1218.

b. Epoxy-Resin Grout: Two-component, mineral-filled epoxy resin type complying with ASTM C 881, of type, grade, and class to suit requirements.

13. Curing: Curing materials and methods shall not discolor the concrete or affect the exposed surfaces and shall comply with PCI MNL 117.

14. Sealant and Joint Filler (Exterior Seals): Exterior joint sealant and backer rod materials as specified under Section 079200 "Joint Sealants".

15. Secondary (Interior) Seals: Compartmental, water based, polymer impregnated, open cell, neoprene extrusion type or closed cell polyurethane foam type preformed compression seal complying with ASTM D 3575 and ASTM D 1056 (modified), complete with liquid lubricant adhesive and primer as recommended by manufacturer, equivalent to Tremco Illmod 600 Pre-Compressed Impregnated Joint Sealing Tape (for vertical and horizontal applications) by Tremco Inc., or Emseal 25V (for vertical applications) and Emseal Soft Seal (for horizontal applications) by Emseal Corporation, or BBSW Secondary Compression Seal (for vertical and horizontal applications) by Balco, Inc.

16. Architectural Precast Concrete Color and Finishes:

a. Exposed Architectural Concrete Surfaces: Light acid etched finish matching appearance of limestone complying with PCI CTG, "Architectural Precast Concrete Color and Texture Selection Guide". Refer to the G-series in the architectural drawings for product codes, colors, and finishes.

b. Concealed Architectural Concrete Surfaces: As-cast finish surface, free of air voids, sand streaks, and honeycombs.

END OF DIVISION 03