SPECIAL SPECIFICATION

SECTION 03450S

PLANT-PRECAST ARCHITECTURAL CONCRETE

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Architectural precast concrete wall panels; with integral insulation; architectural precast concrete pavers and paver pedestals, sills, planters; supports, anchors, and attachments; perimeter and intermediate joint seals; and grouting under panels.

1.02 ENVIRONMENTAL OBJECTIVES

A. As described in section 01805 "Environmental Objectives", the owner has determined that this project must be rated by LEED™ Version 2.0 green building rating system, which was issued in March 2000 by the U.S. Green Building Council, 1015 18th Street, NW, Suite 805, Washington, DC 20036. Phone: 202/ 82-USGBC (828-7422) Fax: 202/ 828-5110.

B. While these goals and implementation strategies are incorporated within the Contract Documents, suggestions and input from the contractor for implementing these goals are encouraged. A team approach is encouraged.

C. Manufacturer/ Fabricator to supply documentation of level of compliance or non-compliance with the following requirements before consideration as an "Acceptable Manufacturer".

1. The Design Team has determined that the following be mandatory requirements:

   a. The product(s) supplied is manufactured/fabricated within a radius of 500 miles from the project site and/or the manufactured/fabricated product(s) are extracted, harvested, or recovered within 500 miles of the project site.

   b. Comply with the requirements of section 01505S "Construction Waste Management"

2. The Design Team has determined that the following be a highly desirable objective:

   a. The product(s) supplied is to have a minimum weighted average of 20% post consumer recycled content material, OR, a minimum weighted average of 40% post-industrial recycled content material.

D. Products that conform to the Environmental Objectives yet do not fully meet other requirements of this section may still be considered at the sole discretion of the Owner and Architect.

1.03 RELATED SECTIONS

A. Section 03300 - Cast-in-Place Concrete: Building structural frame.

B. Section 05120 S - Structural Steel: Building structural frame.

C. Section 76005 – Flashing and Sheet Metal Surface reglets and metal flashings attached to precast units.

D. Section 07270 – Firestop and Smokestop Systems: Fire and Smoke barrier Air seal between precast unit and edge of floor slab.

E. Section 07900S - Joint Sealants: Perimeter joints with sealant and backing.

F. Section 05500S – Metal Fabrications: Placement of anchors for embedding into placing in welding to building structural components.

G. Section 08800 – Glass and Glazing: of window units and glass for placement by this Section.

H. Section 07600 – Flashing and Sheet Metal: Supply of flashing reglets for placement by this Section.

1.04 REFERENCES

A. ACI 301 - Specifications for Structural Concrete for Buildings.

B. ACI 318 - Building Code Requirements for Reinforced Concrete.

C. ACI 523 - Guide for Low Density Precast Concrete.

D. ASCE 7-98 – Minimum Design Loads for Buildings and Other Structures.

E. ASTM A 36/A36M - Carbon Structural Steel.

E. ASTM A 123 - Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.

F. ASTM A 185 - Steel Welded Wire, Fabric, Plain, for Concrete Reinforcement.

G. ASTM A 307 - Carbon Steel Bolts and Studs, 60,000 Pounds per square inch Tensile Strength.

H. ASTM A 325/A325 - High Strength Bolts for Structural Steel Joints.

I. ASTM A 416 - Steel Strand, Uncoated Seven-Wire for Prestressed Concrete.

J. ASTM A 615/A615M - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

K. ASTM A 666 - Austenitic Stainless Steel, Sheet, Strip, Plate, and Flat Bar for Structural Applications

L. ASTM A 767/A767M - Zinc-Coated (Galvanized) Bars for Concrete Reinforcement.

M. ASTM A 775/A775M - Epoxy Coated Reinforcement Steel Bars.

N. ASTM C 31 - Making and Curing Concrete Test Specimens in the Field.

O. ASTM C 33 - Concrete Aggregates.

P. ASTM C 143 - Slump of Hydraulic Cement Concrete.

Q. ASTM C 150 - Portland Cement.

R. ASTM C 260 - Air-Entraining Admixtures for Concrete.

S. ASTM C 330 - Lightweight Aggregates for Structural Concrete.

T. ASTM C618 – Class F Flyash.

U. AWS D1.1 - Structural Welding Code.

V. AWS D1.4 - Structural Welding Code, Reinforcing Steel.

W. PCI MNL-117 - Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products.

X. IBC 2000 International Building Code

Y. PCI MNL-120 - Design Handbook - Precast and Prestressed Concrete.

Z. PCI MNL-122 - Architectural Precast Concrete.

AA. PCI MNL-123 - Manual on Design of Connections for Precast Prestressed Concrete.

1.05 DESIGN REQUIREMENTS

A. Design precast concrete units and connections in accordance with IBC 2000, ACI 318, and PCI MNL-120, MNL-122 and MNL-123.

B. Design precast concrete units and connections for following loads:

1. Weight of panels.

2. Wind and seismic loads as stated on drawings in the project Design Criteria.

3. Collateral loads from attached building components as shown on the drawings.

4. Transportation and handling stresses.

C. Design all connections of precast members to structure, including cast-in-place embeds and welded hardware. Design for pin support at building structure (connection transfers vertical and lateral loads only to the structure, not moment). Resist eccentricity of load between structure and precast member within the member and connection.

D. Design precast concrete units and connections to accommodate seismic drifts as stated on the drawings.

E. Design units to accommodate construction tolerances, deflection of building structural members, and clearances of intended openings.

F. Design component connections to accommodate building movement and thermal movement. Provide adjustment to accommodate misalignment of structure without unit distortion or damage.

1.06 SUBMITTALS

A. Environmental Objectives Documentation: signed by the manufactures/fabricators stating level of compliance for the requirements and objectives in Environmental Objectives in section.

B. Shop Drawings: Shop drawings shall be stamped by design engineer. Indicate layout, unit locations, configuration, unit identification marks, reinforcement, connection details, support items, location of lifting devices, dimensions, openings, and relationship to adjacent materials. Provide erection drawings.

C. Submit complete calculations for precast concrete member and connections, stamped by a registered professional engineer. Include loads, stresses, and provisions for drifts and deflections. Submit calculations with shop drawings as a complete package.

D. Samples: Submit two panels **of each finish;** 2**' by 2'** in size illustrating surface finish, color and texture.

E. Operation and Maintenance Data: Procedures for Project closeout submittals. Indicate surface cleaning instructions.

1.07 QUALITY ASSURANCE

A. Perform Work in accordance with PCI MNL-117, PCI MNL-120, PCI MNL-122, PCI MNL-123, and ACI 318.

B. Welding: AWS D1.1 and AWS D1.4.

C. Maintain one copy of each document on site.

D. Precast Manufacturer and Erector Qualifications: Qualified in accordance with PCI MNL-117 Group A1 - Architectural Concrete.

E. Design units under direct supervision of a professional engineer experienced in design of this Work and licensed at the place where the Project is located.

F. Welder Qualifications: Qualified within previous 12 months in accordance with AWS D1.1 and AWS D1.4.

G. Flyash: ASTM C618, Class F.

1.08 MOCK-UP

A. Construct one mock-up panel, 10 feet **wide** by **1**5 feet **tall**, with lifting device, and attachment points, and finish in accordance with approved sample.

B. Include mock-up panel with typical window, fully glazed, sealants**, panel joints and reveals.**

C. Locate where directed.

D. Mock-up may not remain as part of the Work.

1.09 PRE-INSTALLATION MEETING

A. Convene one week prior to commencing Work of this section.

1.10 DELIVERY, STORAGE, AND HANDLING

A. Handle precast units to position, consistent with their shape and design. Lift and support only from support points.

B. Blocking and Lateral Support During Transport and Storage: Clean, non-staining, without causing harm to exposed surfaces. Provide temporary lateral support to prevent bowing and warping.

C. Protect units to prevent staining, chipping, or spalling of concrete.

D. Mark units with date of production in location not visible to view when in final position in structure.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cement: ASTM C 150, Type I - Normal Portland type; color for facing mix as selected by Architect from manufacturers standard colors.

B. Concrete Materials: ASTM C 33 water and sand.

C. Reinforcing Steel: ASTM A 615, deformed steel bars strength and size commensurate with precast unit design; 100% recycled steel.

D. Reinforcing bar supports: 100% post-consumer recycled plastic as with "Eclipse Plastic."

E. Flyash: ASTM C618, Class F to replace 12% - 15% (by weight) of Portland cement.

F. Air Entrainment Admixture: ASTM C 260.

G. Admixtures: Air entrainment as specified in Section 03300.

H. Surface Finish Aggregate: Clean, natural **1/2**" inch size, buff to light granite color, from single source throughout conforming to ASTM C 33, except local aggregate of proven durability may be used when acceptable to structural engineer.

I. Grout: Non-shrink, minimum 10,000 pounds per square inch, 28-day strength.

2.02 FORM RELEASE AGENTS

A. Material: Vegetable-based form release agent containing zero VOC's, as with "Bio-Form" from"Leahy-Wolf."

2.03 SUPPORT DEVICES

A. Connecting and Support Devices: ASTM A 36 weldable steel.

B. Bolts, Nuts, and Washers: ASTM A 307 or ASTM A 325, high strength steel

C. Primer: Zinc rich type.

2.04 MIX

A. Concrete: Minimum 4,000 pounds per square inch, 28-day strength, air entrained to 5 to 7 percent in accordance with ACI 301. Achieve minimum 2500 psi before removing from forms.

2.05 FABRICATION

A. Fabricate in conformance with PCI MNL-117.

B. Maintain plant records and quality control program during production of precast units. Make records available upon request.

C. Use rigid molds, constructed to maintain precast unit uniform in shape, size, and finish.

D. Utilize form liners.

E. Maintain consistent quality during manufacture.

F. Fabricate connecting devices, plates, angles, items fit to steel framing members, inserts, bolts, and accessories. Fabricate to permit initial placement and final attachment.

G. Weld steel fabrications in accordance with AWS D1.1. Weld reinforcing steel in accordance with AWS D1.4. Do not tack weld reinforcing.

H. Embed reinforcing steel, anchors, inserts plates, angles, and other cast-in items.

I. Locate hoisting devices to permit removal after erection.

J. Cure units to develop concrete quality, and to minimize appearance blemishes such as non-uniformity, staining, or surface cracking.

K. Minor patching in plant is acceptable, providing structural adequacy and appearance of units is not impaired.

2.06 FINISH - PRECAST UNITS

A. **General**: Ensure exposed-to-view finish surfaces of precast units are uniform in color and appearance **and have been cleaned by power wash.**

1. Finish Type: "PC-1": "white"; 1/16" deep light abrasive blast; by Materials Inc., Bernalillo, NM; or approved equal

2. Finish Type" PC-2": #.50 PCS (beige); 1/16" deep light abrasive blast; by Materials, Inc., Barnalillo, NM; or approved equal.

2.07 FINISH - SUPPORT DEVICES

A. Clean surfaces of rust, scale, grease, and foreign matter.

B. Prime paint in one coat except surfaces in direct contact with concrete or requiring field welding.

2.08 FABRICATION TOLERANCES

A. Maximum Out of Square: 1/8-inch in 10 feet, noncumulative.

B. Variation From Dimensions Indicated on shop drawings: Plus or minus 1/8-inch.

C. Maximum Misalignment of Anchors, Inserts, Openings: 1/8-inch.

D. Maximum Bowing of Units: Length of bow, 360.

2.0**9** SOURCE QUALITY CONTROL AND TESTS

A. Provide testing and analysis of concrete mix in accordance with Section 03300.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verify that building structure, anchors, devices, and openings are ready to receive work of this Section.

3.02 PREPARATION

A. Provide for erection procedures and induced loads during erection. Maintain temporary bracing in place until final support is provided.

3.03 ERECTION

A. Erect units without damage to shape or finish. Replace or repair damaged panels.

B. Erect units level and plumb within allowable tolerances.

C. Align and maintain uniform horizontal and vertical joints as erection progresses.

D. When units require adjustment beyond design or tolerance criteria, discontinue affected work; advise A/E.

E. Fasten units in place. Perform welding in accordance with AWS D1.1.

F. Touch-up field welds and scratched or damaged primed painted or galvanized surfaces.

G. Weld reinforcing steel in accordance with AWS D1.4. Do not tack weld reinforcing.

H. Set vertical units dry, without grout, attaining joint dimension with lead or plastic spacers. Pack grout to base of unit.

I. Exposed Joint Dimension: 1/2-inch.

J. Seal perimeter and intermediate joints in accordance with Section 07900S with Elastomeric type sealant.

3.04 ERECTION TOLERANCES

A. Maximum Variation from Plane of Location: 1/4-inch in 10 feet and 3/8-inch in 100 feet, noncumulative.

B. Maximum Offset from True Alignment Between Two Connecting Units: 1/4-inch.

C. Joint Tolerance: Plus or minus 1/4-inch.

3.05 ADJUSTING

A. Adjust units so that joint dimensions are within tolerances.

3.06 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide non-combustible shields during welding operations.

END OF SECTION