SECTION 03450

PLANT-PRECAST ARCHITECTURAL CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes decorative pre-cast window head, jamb, sill and wall panel pieces.

B. Finish, color and texture to match that of existing building to the greatest extent possible.

1.2 PERFORMANCE REQUIREMENTS

A. System Design Requirements:

1. Drawings are diagrammatic and do not purport to identify nor solve problems of thermal or structural movement, anchorage, or moisture disposal.

2. Requirements shown by details are intended to establish basic dimension of units and profiles of members.

3. Attachment considerations are to take into account site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening or fracturing connection between units and building structure or between units themselves.

B. Structural Performance: Provide precast architectural concrete units capable of withstanding design loads within limits and under conditions indicated.

1.3 SUBMITTALS

A. Product Sample: Provide a 12” X 12” sample of precast for comparison to existing.

B. Design Mixes: For each concrete mix.

C. Shop Drawings: Detail fabrication and installation of precast architectural concrete units. Indicate member locations, plans, elevations, dimensions, shapes, cross sections, limits of each finish, and types of reinforcement, including special reinforcement.

D. Welding certificates.

E. Material certificates.

1.4 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator who assumes responsibility for engineering precast architectural concrete units to comply with performance requirements. This responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

B. Design Standards: Comply with ACI 318 and the design recommendations in PCI MNL 120, "PCI Design Handbook--Precast and Pre-stressed Concrete."

C. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel"; and AWS D1.4, "Structural Welding Code--Reinforcing Steel."

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store units at Project site to prevent cracking, distorting, warping, staining, or other physical damage, and so markings are visible.

B. Lift and support units only at designated lifting and supporting points shown on Shop Drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Steel Reinforcing:

1. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
2. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.
3. Plain-Steel Wire: ASTM A 82, as drawn.
4. Deformed-Steel Wire: ASTM A 496.
5. Plain-Steel Welded Wire Fabric: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
6. Deformed-Steel Welded Wire Fabric: ASTM A 497, flat sheet.
7. Supports: Manufacturer's bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place according to PCI MNL 117.

B. Concrete:

1. Portland Cement: ASTM C 150, Type I or Type III, gray, of same type, brand, and source.
2. Normal-Weight Aggregates: ASTM C 33, with coarse aggregates complying with Class 5S.
3. Coloring Admixture: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures, temperature stable, non-fading, and alkali resistant.
4. Air-Entraining Admixture: ASTM C 260.
5. Fly Ash Admixture: ASTM C 618, Class C or F.
6. Metakaolin Admixture: ASTM C 618, Class N.
7. Silica Fume Admixture: ASTM C 1240.

C. Sand-Cement Grout: Portland cement, ASTM C 150, Type I, and clean, natural sand, ASTM C 144. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.

2.2 CONCRETE MIXES

A. Finish, color and texture to match that of existing building to the greatest extent possible.

B. Normal-Weight Concrete Face and Backup Mixes: Proportion mixes by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:

1. Compressive Strength (28 Days): 5000 psi.
2. Maximum Water-Cementitious Materials Ratio: 0.45.

C. Water Absorption: 12 to 14 percent by volume.

D. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content of 6% +/- 1%.

2.3 FABRICATION

A. Anchorage Hardware: Fabricate with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during pre-casting operations.
1. Anchorage Hardware to be hot dipped galvanized.
2. Precast manufacturer to determine size, quantity and location of anchors to support their product to the steel frame of building.

B. Furnish loose steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing precast concrete units to supporting and adjacent construction.

C. Cast-in reglets, slots, holes, and other accessories in precast concrete units to receive cramps, dowels, reglets, waterstops, flashings, and other similar work as indicated.

D. Reinforcement: Comply with recommendations in CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

E. Reinforce precast concrete units to resist handling, transportation, and erection stresses.

F. Mix concrete according to PCI MNL 117 and requirements in this Section. After concrete batching, no additional water may be added.

G. Place concrete in a continuous operation to prevent seams or planes of weakness from forming in precast concrete units.

H. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items.

I. Comply with ACI 306.1 procedures for cold-weather concrete placement.

J. Comply with ACI 305R recommendations for hot-weather concrete placement.

K. Identify pickup points of precast concrete units and orientation in structure with permanent markings, complying with markings indicated on Shop Drawings.

L. Cure concrete by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture.

M. Discard precast concrete units that are warped, cracked, broken, spalled, stained, or otherwise defective unless repairs are approved by Architect.

2.4 FINISHES

A. Finish exposed-face surfaces of precast architectural concrete units to match approved design reference sample and as follows:
   1. Smooth-Surface Finish: Free of pockets, sand streaks, and honeycombs, with uniform color and texture.
   2. Finish, color and texture to match that of existing building to the greatest extent possible.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install precast concrete units level, plumb, square, true, and in alignment.

B. Repair exposed exterior surfaces of precast concrete units to match color, texture, and uniformity of surrounding precast architectural concrete if permitted by Architect.

C. Clean exposed surfaces of precast concrete units after erection to remove weld marks, other markings, dirt, and stains.

END OF SECTION 03450