

NITTERHOUSE MASONRY PRODUCTS SPECIFICATIONS FOR: ECOLOGY BLOCK

ARCHITECTURAL PRECAST CONCRETE

SECTION 034500

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings 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 the performance criteria, materials, design, production, and erection of architectural precast concrete for the entire project. The work performed under this Section includes all labor, material, equipment, related services, and supervision required for the manufacture and erection of the architectural precast concrete work shown on the Contract Drawings.
- B. Section includes the following:
1. Architectural precast concrete cladding [**and loadbearing**] units.
 2. Insulated, architectural precast concrete units.
 3. Clay product-faced, architectural precast concrete units.
 4. Stone veneer-faced, architectural precast concrete units.
1. Section 03410 "Precast Structural Concrete" with an architectural finish.
 2. Section 03300 "Cast-in-Place Concrete" for installing connection anchors in concrete.
 3. Section 03491 "Glass-Fiber-Reinforced Concrete."
 4. Section 04851 "Dimension Stone Cladding" for furnishing stone facings and anchorages.
 5. Section 04720 "Cast Stone" for wet or dry cast stone facings, trim, and accessories.
 6. Section 04810 "Unit Masonry" for full-thickness brick facing, mortar, inserts, and anchorages.
 7. Section 05120 "Structural Steel" for furnishing and installing connections attached to structural-steel framing.
 8. Section 05500 "Metal Fabrications" for furnishing and installing loose hardware items, kickers, and other miscellaneous steel shapes.
 9. Section 07190 "Water Repellents" for water-repellent finish treatments.
 10. Section 07620 "Sheet Metal Flashing and Trim" for flashing receivers and reglets.
 11. Section 07920 "Joint Sealants" for elastomeric joint sealants and sealant backings.
 12. Section 08520 "Aluminum Windows" for windows set into architectural precast concrete units.
 13. Section 09310 "Ceramic Tile" for ceramic tile setting materials and installation.
 14. Section 112423 "Window Washing Equipment" for tie-backs located in architectural precast concrete units.

1.3 DEFINITION

- A. Reference Sample: Sample of approved architectural precast concrete color, finish and texture, preapproved by Architect.

1.4 PERFORMANCE REQUIREMENTS

- A. **Structural Performance: Provide architectural precast concrete units and connections capable of withstanding the following design loads within limits and under conditions indicated:**
- Loads: As indicated.
- B. **Structural Performance: Provide architectural precast concrete units and connections capable of withstanding the following design loads within limits and under conditions indicated:**
1. Stone to Precast Concrete Anchorages: Provide anchors, as determined through Owner's or stone supplier testing, in numbers, types, and locations required to satisfy specified performance criteria.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Retain quality control records and certificates of compliance for 5 years after completion of structure.
- B. LEED Submittals:
1. Product Data for Credit MR 4.1 [**and Credit MR 4.2**]: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer (postindustrial) recycled content per unit of product.
 - a. Indicate recycled content; indicate percentage of preconsumer and postconsumer recycled content per unit of product.
 - b. Indicate relative dollar value of recycled content product to total dollar value of product included in project.
 - c. If recycled content product is part of an assembly, indicate the percentage of recycled content product in the assembly by weight.
 - d. If recycled content product is part of an assembly, indicate relative dollar value of recycled content product to total dollar value of assembly.
 2. Product Data for Credit MR 5.1 [**and Credit MR 5.2**]: For local and regional material extracted/harvested and manufactured within a 500 mile radius from the project site.
 - a. Indicate location of extraction, harvesting, and recovery; indicate distance between extraction, harvesting, and recovery and the project site.
 - b. Indicate location of manufacturing facility; indicate distance between manufacturing facility and the project site.
 - c. Indicate dollar value of product containing local/regional materials; include materials cost only.
 - d. Where product components are sourced or manufactured in separate locations, provide location information for each component. Indicate the percentage by weight of each component per unit of product.
 3. Include MSDS product information showing that materials meet any environmental performance goals such as biobased content.

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1. For projects using FSC certified formwork, include chain-of-custody documentation with certification numbers for all certified wood products.
 2. For projects using reusable formwork, include data showing how formwork is reused.
- A. Design Mixtures: For each precast concrete mixture. Include results of compressive strength and water-absorption tests.
- B. Shop Drawing:
1. Detail fabrication of architectural precast concrete units.
 2. Indicate elevations, dimensions, shapes, and cross-sections of each unit.
 3. Indicate aesthetic intent including joints, drips, chamfers, rustications or reveals, and extent and location of each surface finish.
 4. Indicate details at building corners.
 5. Indicate separate face and backup mixture locations and thicknesses. (If necessary)
 6. Indicate locations, tolerances, and details of anchorage devices to be embedded in or attached to structure or other construction.
 7. Indicate plan views and elevations showing unit location and dimensions.
 8. Indicate location of each architectural precast concrete unit by same identification mark placed on unit.
- C. Samples: Design reference samples for initial verification of design intent, approximately 12 x 12 x 2 in. (300 x 300 x 50 mm), representative of finishes, color, and textures of exposed surfaces of architectural precast concrete units.
1. When back face of precast concrete unit is to be exposed, include Samples illustrating workmanship, color, and texture of the backup concrete as well as facing concrete.
- C. Design Standards: Comply with ACI 318 (ACI 318M) and design recommendations of PCI MNL 120, PCI Design Handbook - Precast and Prestressed Concrete, applicable to types of architectural precast concrete units indicated.
- D. 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.
- E. Sample Panels: After sample approval and before fabricating architectural precast concrete units, produce a minimum of **[two]** **<Insert number>** sample panels approximately **(16 ft² [1.5 m²])** **<Insert size>** in area for review by Architect. Incorporate full-scale details of architectural features, finishes, textures, and transitions in sample panels.
- F. Range Sample Panels: After sample panel approval and before fabricating architectural precast concrete units, produce a minimum of **[three][five]** **<Insert number>** samples, approximately **(16 ft² [1.5 m²])** **<Insert number>** in area, representing anticipated range of each color and texture on Project's units. Maintain samples at the fabricator's plant as color and texture acceptability reference.
- G. Mockups: After sample panel **[and range sample]** approval but before production of architectural precast concrete units, construct full-sized mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution. Mockups to be representative of the finished work including **[aluminum framing, glass, sealants]** **<Insert construction>** and architectural precast concrete complete with anchors, connections, flashings, and joint fillers as accepted on the final Shop Drawings. Build mockups to comply with the following requirements, using materials indicated for the completed work.
- H. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.

1.6 INFORMATIONAL SUBMITTALS

- A. Material Test Reports for aggregates: From an accredited testing agency, indicating and interpreting test results for compliance with requirements indicated:
- B. Material Certificates. For the following items signed by manufacturers:
- a. Cementitious materials.
 - b. Reinforcing materials.
 - c. Admixtures.

1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm that complies with the following requirements and is experienced in producing architectural precast concrete units similar to those indicated for this Project and with a record of successful in-service performance.

Supplier: **Nitterhouse Masonry Products LLC**
859 Cleveland Ave
Chambersburg, PA 17201
717-267-4500
www.nitterhousemasonry.com

- B. Testing Agency Qualifications: An independent accredited testing agency **[acceptable to authorities having jurisdiction]**, qualified according to ASTM C 1077, ASTM E 329 and ASTM E 543 to conduct the testing indicated.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver architectural precast concrete units in such quantities and at such times to ensure compliance with the agreed upon project schedule and setting sequence and also to limit unloading units temporarily on the ground or other rehandling.
- B. Support units during shipment on non-staining shock-absorbing material.
- C. Store units with adequate dunnage and bracing, and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping, or other physical damage.
- D. Place stored units so identification marks are clearly visible, and units can be inspected.
- E. Handle and transport units in a manner to avoid excessive stresses which could cause cracking or damage.

PART 2 - PRODUCTS

2.1 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.
- C. Galvanized Reinforcing Bars: **[ASTM A 615/A 615M, Grade 60 (Grade 420)] [ASTM A 706/A 706M]**, deformed bars, ASTM A 767/A 767M Class II zinc-coated, hot-dip galvanized and chromate wash treated after fabrication and bending.

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- A. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, fabricated from **[as-drawn] [galvanized and chromate wash treated]** steel wire into flat sheets.
- B. Deformed Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet
- C. Epoxy Coated-Steel Welded Wire Reinforcement: ASTM A 884/A 884M Class A coated, **[plain] [deformed]**, flat sheet, Type **[1 bendable] [2 non-bendable]** coating.
- D. Supports: 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 117.

2.2 CONCRETE MATERIALS

- A. Portland Cement: ASTM C150, Type I or III.
 - a. For surfaces exposed to view in finished structure, use **[gray] [or] [white]**, of same type, brand, and mill source throughout the precast concrete production.
- B. Normal weight Aggregates: Except as modified by PCI MNL 117, ASTM C 33, with coarse aggregates complying with Class 5S. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.
- C. Coloring Admixture: ASTM C 979, synthetic or natural mineral-oxide pigments or colored water-reducing admixtures, temperature stable, and nonfading.
- D. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 117.
- E. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.

Chemical Admixtures:

- 1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
- 2. Retarding Admixture: ASTM C 494/C 494M, Type B.
- 3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
- 4. Water-Reducing and Accelerating Admixture: ASTM C 494/C 494M, Type E.
- 5. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
- 6. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
- 7. Plasticizing Admixture for Flowable Concrete: ASTM C 1017/C 1017M.

2.3 CONCRETE MIXTURES

- A. Prepare design mixtures to match Architect's sample or for each type of precast concrete required
- B. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast concrete plant personnel at architectural precast concrete fabricator's option.
- C. Limit water-soluble chloride ions to the maximum percentage by weight of cement permitted by ACI 318 (ACI 318M) or PCI MNL 117 when tested in accordance with ASTM C 1218/C 1218M.
- D. Compressive Strength (28 Days): 5000 psi (34.5 MPa) minimum.
- E. Maximum Water-Cementitious Materials Ratio: 0.45.
- F. Water Absorption: 6 percent by weight or 14 percent by volume, tested according to ASTM C 642

2.4 FABRICATION TOLERANCES

- A. Fabricate architectural precast concrete units of shapes, lines and dimensions indicated, so each finished unit complies with PCI MNL 117 product tolerances as well as position tolerances for cast-in items.
- B. Fabricate architectural precast concrete units of shapes, lines and dimensions indicated, so each finished unit complies with the following product tolerances.
 - 1. Overall Height and Width of Units, Measured at the Face Exposed to View: As follows:
 - a. 10 ft (3 m) or under, Plus or Minus 1/8 in. (± 3 mm).
 - b. 10 to 20 ft (3 to 6 m), Plus 1/8 in. (+3 mm), Minus 3/16 in. (-5 mm).
 - c. 20 to 40 ft (6 to 12 m), Plus or Minus 1/4 in. (± 6 mm).
 - d. Each additional 10 ft (3 m), add Plus or Minus 1/16 in. (± 1.6 mm).
 - 2. Overall Height and Width of Units, Measured at the Face Not Exposed to View: As follows:
 - a. 10 ft (3 m) or under, Plus or Minus 1/4 in. (± 6 mm).
 - b. 10 to 20 ft (3 to 6 m), Plus 1/4 in. (+6 mm), Minus 3/8 in. (-10 mm).
 - c. 20 to 40 ft (6 to 12 m), Plus or Minus 3/8 in. (± 10 mm).
 - d. Each additional 10 ft (3 m), add Plus or Minus 1/8 in. (± 3 mm).

2.5 FINISHES

- A. Exposed panel faces shall be free of joint marks, grain, and other obvious defects. Corners, including false joints shall be uniform and straight. Finish exposed-face surfaces of architectural precast concrete units to match approved sample.
- B. Acid-Etched Finish: Use acid and hot-water solution, equipment, application techniques, and cleaning procedures to expose aggregate and surrounding matrix surfaces to match accepted sample or mockup units. Protect hardware, connections, and insulation from acid attack.

PART 3 – EXECUTION

3.1 PREPARATION

- A. Furnish anchorage devices for precast concrete units to be embedded in or attached to the building structural frame or foundation before start of such Work. Provide locations, setting diagrams, templates and instructions for the proper installation of each anchorage device.

3.2 EXAMINATION

- A. Examine supporting structural frame or foundation and conditions for compliance with requirements for installation tolerances, bearing surface tolerances, and other conditions affecting precast concrete performance.
- B. Proceed with precast concrete installation only after unsatisfactory conditions have been corrected.
- C. Contractor shall notify precast concrete erector that supporting cast-in-place concrete foundation and building structural framing has attained minimum allowable design compressive strength or supporting steel or other structure is structurally ready to receive loads from precast concrete units prior to proceeding with installation.

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3.3 CLEANING

- A. Clean all surfaces of precast concrete to be exposed to view, as necessary, prior to shipping.
- B. Clean mortar, plaster, fireproofing, weld slag, and any other deleterious material from concrete surfaces and adjacent materials immediately.
- C. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, dirt, stains and other markings.
 - 1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's recommendations. Protect adjacent work from staining or damage due to cleaning operations.
 - 2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION 034500

MANUFACTURER QUALIFICATIONS

As manufactured by Nitterhouse Masonry Products, LLC
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