

## PART 1 GENERAL

## 1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Agreement, including General and Supplementary Conditions, and Division 01 of the Specifications, apply to work of this section.
- B. Section 033000 - Cast in Place Concrete

## 1.02 SCOPE

- A. Furnish labor and materials necessary to install a complete precast concrete stair including required landings.

## 1.03 STANDARDS

- A. All work of this section shall conform to industry standards and/or manufacturer's recommendations.
- B. ACI 301 "Specifications for Structural Concrete".
- C. ACI 318 "Building Code Requirements for Reinforced Concrete".
- D. Concrete Reinforcing Steel Institute, "Manual of Standard Practice".
- E. Pre-stressed Concrete Institute MNL 116, "Manual for Quality Control for Plants and Production of Precast Concrete Products".
- F. Pre-stressed Concrete Institute MNL 135, "Tolerance Manual for Precast and Pre-stressed Concrete Construction".
- G. Pre-stressed Concrete Institute MNL 120, PCI Design Handbook".
- H. American Welding Society, AWS D1.1 "Structural Welding Code - Steel", D1.4 "Structural Welding Code - Reinforcing Steel", D1.6 "Structural Welding Code - Stainless Steel", C5.4, "Recommended Practices for Stud Welding".

## 1.04 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide precast structural concrete units and connections capable of withstanding the following design loads within the limits and under conditions indicated:
  - 1. Stairs shall be designed to support the full dead load plus 100 psf live load.
  - 2. Short term and long-term deflection maximums shall be not greater than Table 9.5 (b) of ACI-318.

## 1.05 SUBMITTALS

- A. Pursuant to Section 013300 - Submittal Procedures
- B. Pursuant to Section 016100 - Product Requirements
- C. Shop Drawings: Signed, dated and sealed by fabricator's Professional Engineer registered in state in which Project is located, including complete details and schedules for fabrication and assembly of precast members, procedures, and diagrams. Shop drawings shall also show dimensions for proper fabrication; reinforcing steel sizes, grades and locations; insert

accessories and handling methods; calculations for reinforcing; details, sections, jointing, anchoring, and all other necessary information.

- D. Setting Drawings: Indicate each piece by number and mark units with corresponding non-staining numbers. All signs of numbering shall not be visible in the finished product.
- E. Test Reports: Perform all concrete testing in accordance with PCI MNL-116 requirements. Submit copies of all test reports.

#### 1.06 QUALITY ASSURANCE

- A. All work of this section shall be performed by experienced workmen familiar with the work and according to manufacturer's recommendations and/or industry standards.
- B. Fabricator Qualifications: Fabricator must be a producer member of the Pre-stressed Concrete Institute (PCI) and/or participate in its Plant Certification Program.

#### 1.07 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Pursuant to manufacturers published instructions.
- B. Precast units shall be cured to the required 28-day strength prior to shipment.
- C. Carefully transport and handle precast concrete stairs so as to prevent soiling or damage. Store clear of ground in manner to prevent cracking, distortion, warping, and to protect from damage and dirt. Soiling or staining of precast stair units may be cause for rejection of units, if in Architect's opinion units cannot be adequately cleaned.
- D. Lift and support stairs only at designated lifting or supporting points as shown on shop and setting drawings.

### PART 2 PRODUCTS

#### 2.01 MANUFACTURERS

- A. Fabricators: Subject to compliance with requirements, provide products by the following:
  - 1. Castcon-Stone, Inc., 2900 South Noah Drive, Saxonburg, PA 16056. Phone: (724) 352-2200, Fax: (724) 352-2290.
  - 2. Shea Concrete Products, 773 Salem St., Wilmington, MA 01887. Phone: (800) 696-7432.
  - 3. Architect Approved Equivalent.

#### 2.02 MATERIALS

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Plain-Steel Welded Wire Reinforcement: ASTM A 185 or A497 fabricated from plain steel wire formed into flat sheets having a minimum yield strength of 70,000 psi.
- C. Plates and Angles: Cast-in loose plates and angles shall be hot dipped galvanized.
- D. Inserts: Lifting inserts and inserts to receive railing post bolts to be stainless steel. Provide threaded plugs to keep all threaded inserts clean of any foreign material.
- E. Water: Potable, clean and free from oils, acids, salts or other injurious substances.
- F. Admixtures:

1. Air Entrainment agents shall conform to ASTM C 260
  2. Water reducing agent shall conform to ASTM C494, Type A
  3. High range water reducing agent shall conform to ASTM C494, Type A
- G. Portland Cement: ASTM C150, Type III, gray
- H. Normal Weight Aggregate:
1. Fine Aggregate: ASTM C33, washed natural sand
  2. Course Aggregate: Crushed Stone conforming to ASTM C33. Aggregate shall be graded crushed stone with a resulting weight of concrete up to 155 lbs./cu.ft.
- I. Grout: Cement & sand shall match cement and sand used in precast concrete.
- J. Stair Nosing: Wooster Products Type 241BF Nosing 4" deep x width of stair less 6". Abrasive filler color as selected by Architect.
- K. Sealer: L&M™ AQUAPEL™ from L&M Construction Chemicals, a product brand of Laticrete International.

## 2.03 STRENGTH

- A. Concrete strength shall be 5,000 psi in 28 days.

## 2.04 FABRICATION

- A. Casting shall be done in rigidly constructed steel forms designed to produce dimensionally correct members with uniform surfaces in accordance with shop drawings.
- B. At time of casting, Fabricator shall incorporate all accessories, reinforcing steel and handling devices required for proper installation and handling of units.
- C. Welding shall be continuous with Low-Hydrogen rods per AWS A5.1 or A5.5
- D. Provide additional temporary or permanent steel hangars to support stairs during construction and until permanent structural supports are in place.
- E. Provide finished units, which are straight, true to size and shape, and within specified casting tolerances.
- F. The underside of all precast stairs and landings shall have a smooth trowel finish. Screed finish is not acceptable.
- G. Make exposed edges sharp, straight, and square. Make flat surfaces into a true plane.
- H. Place and secure in the form aluminum stair nosings. Provide urethane coating on all aluminum products.
- I. Place and secure in the forms all anchors, clips, stud bolts, inserts, lifting devices, shear ties, and other devices required for handling and installing the precast units and for attachment of subsequent items indicated and specified.
- J. Curing: Form curing by moisture retention without supplemental heat until concrete reaches adequate strength for removal of product from forms, a minimum of 2,500 psi.
- K. Casting tolerances: Maintain casting, bowing, warping and dimension tolerances within PCI MNL-116 and PCI MNL-135 requirements.

- L. Provide construction covers on all stairs prior to shipment. Construction covers to be maintained in place until substantial completion.

## 2.05 RAILINGS

- A. Refer to Section 055100 - Metal Stairs, Handrails and Railings for stair guardrails and railings. Provide female, stainless steel, threaded inserts in precast units for attachment of railing posts.

## PART 3 - EXECUTION

### 3.01 EXAMINATION

- A. Examine supporting structural frame, masonry walls, concrete slabs, foundation and conditions for compliance with requirements for installation tolerances, true and level bearing surfaces, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Do not install precast concrete stairs until supporting structure has attained minimum allowable design compressive strength or until required supporting steel or other structure is complete.
- D. Coordinate sequencing of stair installation with other trades.

### 3.02 INSTALLATION

- A. Install in accordance with approved shop drawings and manufacturer's recommended installation procedures. Anchor all components firmly into position.
- B. Powder Actuated Fasteners: Do not use Powder Actuated Fasteners for surface attachment of accessory items except as specifically accepted by precast unit manufacturer.
- C. Handling and Erection: Temporarily stabilize all precast work until permanent connections and/or adjoining cast-in-place concrete work or masonry has been completed, reached its design strength and the framework is stable.
- D. Grouting:
  - 1. After precast units have been placed and secured, grout open spaces at connections and joints between platforms and stairs.
  - 2. Provide forms or other acceptable method to retain grout in place until it is sufficiently cured to support itself.
  - 3. Place grout in a manner to finish smooth, plumb, and level with adjacent concrete surfaces.
  - 4. Keep grouted surfaces damp for not less than 48 hours after grout has taken its initial set. Promptly remove grout material from exposed surfaces before it has hardened.
  - 5. Mix for grout shall have a minimum compressive strength of 4,000 psi at 28 days and have an 8" minimum to 10" maximum slump. Mortar shall not be used for grout. Grout color to match precast concrete color.
- E. Patching: Patch precast units if strength and/or appearance has not been impaired. Manufacturer of precast units shall point up all chopped areas. Pointed up areas shall have minimum variation in texture and color. Amount of variation shall be acceptable to the Architect.
- F. Sealing: Field applied on all exposed surfaces in accordance with manufacturer's instructions and recommendations.

**3.03 REJECTION**

- A. Damaged or structurally questionable precast stair and landing units shall be subject to load test in accordance with Building Code of the American Concrete Institute (ACI 318). Units failing to pass load test shall be rejected. Costs of failed tests shall be borne by Contractor.
- B. Precast units, which require patching, shall be rejected if patching does not restore the damaged unit to its original intended strength and original appearance with minimum variations in color and texture according to PCI MNL-116 standard structural finishes and subject to Architect's approval.

**END OF SECTION**