

## **SECTION 03 41 23 – PRECAST CONCRETE STAIRS AND LANDINGS**

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### **PART 1 – GENERAL**

#### **1.1 REFERENCE STANDARDS**

- .1 Do precast work in accordance with CSA A23.4-09
- .2 Do welding in accordance with CSA W59-03.

#### **1.2 QUALITY OF MANUFACTURER**

- .1 Manufacturer of precast stairs and landings shall be certified by CSA, meeting requirements of CSA A23.4-09 for appropriate class of work.
- .2 Manufacturer of precast stairs and landings shall be fully experienced in and equipped for this type of work and shall be able to document minimum five consecutive years of activity in the field and have successfully completed projects of similar size and complexity.
- .3 Manufacturer of precast stairs and landings shall be a member of the National Precast Concrete Association (NPCA).
- .4 Approved manufacturer: **Hy-Grade Precast Concrete** (905.684.8568).

#### **1.3 DESIGN CRITERIA**

- .1 Design precast concrete elements to carry handling and expected service loads, without detrimental effects.
- .2 Retain a structural engineer, registered in Ontario, experience in the field of precast concrete stairs and landings to ensure adequacy of the structural aspects of the design, shop drawings, manufacturing, transportation and installation of all precast concrete components, attachments, hardware and assemblies.

#### **1.4 QUALITY ASSURANCE**

- .1 Conform to requirements of CSA A23.4-09 for allowable tolerances.

#### **1.5 SUBMITTALS**

- .1 Prepare and submit detailed erection drawings, containing all pertinent information in regard to the erection of the precast concrete stairs and landings including:
  - a. Location of each unit in the completed structure and identifying marks for each unit
  - b. Size and dimensions of each stair complete with connection details
  - c. Grade of reinforcement, concrete strength and admixtures
  - d. Locations and details for lifting hooks and handling points
  - e. Sequence of erection and any special instructions that may be required in handling and setting.
- .2 Shop drawings to be sealed by professional engineer licensed to practice in jurisdiction of this project.

#### **1.6 DELIVERY, HANDLING AND STORAGE**

- .1 Proper lifting devices for the stair units shall be incorporated to ensure that they will be safely and efficiently handled and not produce distortion, cracking or deflection nor strain or adversely affect the units.
- .2 Precast stair units shall be handled and adequately protected during fabrication, curing, storage and transport by methods that will prevent damage, warping, cracking, breakage, chipping, staining or other disfigurement. Units shall not be permitted to contact the earth or other staining influences.
- .3 Repair chipped, checked, cracked, blemished or defective units.
- .4 Precast stair units shall be delivered to the site clearly marked in an acceptable manner as indicated on the Shop Drawings. Markings shall not be visible once stair unit is installed.

### **PART 2 – PRODUCTS**

#### **2.1 MATERIALS**

- .1 Cement, aggregates, water, admixtures: to CSA A23.4-09.
- .2 Formwork materials: All forms shall be steel, accurately constructed, well braced and stiffened to avoid deformations under pressure of wet concrete and vibrators. The quality of forms shall be such that all dimensional tolerances and exposed concrete quality can be consistently maintained.

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- .3 Use same brands and source of cement and aggregate for entire project to ensure uniformity of colouration and other mix characteristics.
- .4 Reinforcing steel: to CAN/CSA-G30.18-M92. All reinforcing steel to be weldable grade 400W.
- .5 Anchors: hot dip galvanized steel, concealed, designed to satisfy specific design and performance criteria.

### **2.2 CONCRETE MIXES**

- .1 Use concrete mix designed to produce minimum 35 MPa compressive strength at 28 Days.

### **2.3 FABRICATION**

- .1 The steel stair forms shall be manufactured to produce raised non-slip continuous parallel ridges near the tread nosing.
- .2 The underside of all precast stairs shall have a smooth trowel finish. Screed finish is not acceptable.
- .3 Accurately set reinforcing steel. Vibrate continuously during casting of concrete.
- .4 Bearing areas shall be reinforced against diagonal tension, splitting, rupture and flexure. Extra ties, stirrups and reinforcing bars shall be placed at support points.
- .5 Support precast stair units uniformly while curing. Keep a daily check to detect any development of warpage or other distortion. Rearrange supports as required to compensate for warpage or distortion.
- .6 Cast-in lifting devices required for erection of the precast concrete stair units. Ensure that lifting devices used externally or cast into units are capable of supporting the precast units in all positions that the units may be in during course of manufacture, transportation and installation. Ultimate capacity of lifting devices shall be sufficient to resist forces obtained by applying load factor of 4:1.
- .7 Mark each precast unit to correspond to identification mark on shop drawings for location.
- .8 Mark each precast unit with date cast.
- .9 Markings shall be on part of unit which will not be exposed.

## **PART 3 – EXECUTION**

### **3.1 EXAMINATION**

- .1 Prior to start of installation on site, examine location, spacing and level of inserts installed.
- .2 Report unsatisfactory conditions prior to installation. Start of installation shall imply acceptance of conditions.

### **3.2 INSTALLATION**

- .1 Erection of the precast stairs and landings, at the site, shall be by the contractor.
- .2 All work shall be executed using workers skilled in the trade of precast erection.
- .3 All stair and landing units shall be set plumb, true and square, with joints parallel and uniform, all in accordance with approved Erection Drawings.
- .4 Units shall be anchored securely and rigidly to supporting work.
- .5 Contractor (not precast manufacturer) shall provide and supply all anchors, fixing devices, supports, and misc. installation hardware necessary
- .6 Grout joints at supports with non-shrink grout.
- .7 Patch holes at lifting hook locations, to match adjacent surfaces

### **3.3 CLEANING**

- .1 Clean soiled precast concrete surfaces by approved means to satisfaction of consultant.
- .2 Repair units that have minor visual defects to the satisfaction of consultant.

### **3.4 INSPECTION AND TESTING**

- .1 All inspection and testing as directed by consultant. Costs incurred for all inspection and testing shall be the responsibility of the contractor.

**END**