

## **SECTION 033053 - LANDSCAPE CAST-IN-PLACE CONCRETE**

### **PART 1 GENERAL**

#### **1.1 SUMMARY**

- A. Section Includes:
  - 1. Concrete formwork.
  - 2. Concrete reinforcement.
  - 3. Cast-in-place concrete.
  - 4. Concrete finishing.
- B. Related Sections:
  - 1. Division 01: Administrative, procedural, and temporary requirements.
  - 2. Section 321313 - Landscape Concrete Paving.

#### **1.2 REFERENCES**

- A. American Concrete Institute (ACI):
  - 1. 301 - Structural Concrete for Buildings.
  - 2. 302.1 - Guide for Concrete Floor and Slab Construction.
  - 3. 305R - Hot Weather Concreting.
  - 4. 306R - Cold Weather Concreting.
  - 5. 318 - Building Code Requirements for Structural Concrete.
- B. ASTM International (ASTM):
  - 1. A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
  - 2. A615/A 615M - Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
  - 3. A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete.
  - 4. C33/C33M - Standard Specification for Concrete Aggregates.
  - 5. C94/C94M - Standard Specification for Ready-Mixed Concrete.
  - 6. C150/C150M - Standard Specification for Portland Cement.
  - 7. C171/C171M - Standard Specification for Sheet Materials for Curing Concrete.
  - 8. C260/C260M - Standard Specification for Air-Entraining Admixtures for Concrete.
  - 9. C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete.
  - 10. C494/C494M - Standard Specification for Chemical Admixtures for Concrete.
  - 11. D1752 - Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
- C. Concrete Reinforcing Steel Institute (CRSI) - Manual of Practice.

#### **1.3 SUBMITTALS**

- A. Submittals for Review:
  - 1. Samples: 12 x 12 colored concrete samples in each color and finish.
  - 2. Concrete Mix Designs: Submit for each type of concrete.

#### **1.4 QUALITY ASSURANCE**

- A. Installer Qualifications: Minimum 5 years experience in work of this Section.
- B. Concrete Mix Design:
  - 1. In accordance with ACI 301, Method 1 or 2.
  - 2. Free from admixtures and additives not specifically approved by coloring admixture manufacturer.

## 1.5 DELIVERY, STORAGE AND HANDLING

- A. Mix and deliver concrete to project ready mixed in accordance with ASTM C94.
- B. Schedule delivery so that pours will not be interrupted for over 15 minutes.
- C. Place concrete on site within 90 minutes after proportioning materials at batch plant.

## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. Formwork:
  - 1. Forms: Wood, metal, or glass fiber type, tight fitting.
  - 2. Fasteners: Size as required, sufficient strength to maintain forms in place while concrete is placed.
  - 3. Form release agent: Nonstaining, colorless mineral oil that will not absorb moisture, stain concrete, or impair adhesion of coatings to be applied to concrete.
  - 4. Construction joints forms: Formed steel, with keyway.
  - 5. Form ties: Snap off type, adjustable length, 1 inch back break dimension, free of defects that could leave holes larger than 1 inch in concrete.
- B. Reinforcement:
  - 1. Bars: ASTM A615/A615M, deformed billet steel.
  - 2. Welded wire fabric: ASTM A1064/A1064M; furnish in flat sheets.
  - 3. Chairs, bolsters, bars supports, and spacers:
    - a. Sized and shaped for support of reinforcement during concrete placement.
    - b. Plastic coated steel for surfaces exposed to weather.
  - 4. Tie wire: Annealed steel, 16 gage minimum.
- C. Concrete Materials:
  - 1. Portland cement: ASTM C150/C150M, Type I or III as applicable.
  - 2. Aggregates: ASTM C33/C33M, clean, hard, durable, and uncoated.
    - a. Fine: Natural sand, free from silt, loam, and clay.
    - b. Coarse: Crushed stone, maximum size No. 467, Table No. 2.
  - 3. Admixtures:
    - a. Water reducing or water reducing/set retarding: ASTM C494/C494M, Type A or D.
    - b. Air entraining: ASTM C260/C260M.
    - c. Coloring: Refer to Materials Legend.
- D. Expansion Joint Filler: ASTM D1752, Type 1, non asphaltic.
- E. Non Shrink Grout: Premixed, consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; 7,000 PSI compressive strength at 28 days.
- F. Curing Materials:
  - 1. Curing compound: ASTM C309/C309M, Type 1.
  - 2. Curing paper: ASTM C171/C171M, waterproof paper or polyethylene film.
- G. Bonding Agent: Two component modified epoxy resin.
- H. Water: Clean and potable.

### 2.2 MIXES

- A. Proportions: In accordance with ACI 301.

- B. Design concrete to yield following characteristics unless otherwise indicated:
  - 1. Minimum 28 day compressive strength: 3000 PSI.
  - 2. Slump:
    - a. Footings: 4 to 6 inches.
    - b. Other uses: 3 to 5 inches.
  - 3. Air entrainment: Provide air entraining admixture to produce 4 to 6 percent air by volume of concrete.
- C. Colored Concrete:
  - 1. Add coloring admixture to concrete in accordance with manufacturer's instructions.
  - 2. Provide uniformity of color.

## 2.3 FABRICATION

- A. Reinforcing: In accordance with CRSI Manual.

## PART 3 EXECUTION

### 3.1 PREPARATION

- A. Notify Owner, Landscape Architect, and Testing Laboratory minimum 24 hours prior to placing concrete.
- B. Remove water and debris from forms and excavations before concrete is deposited.
- C. Provide devices for conveying concrete to point of deposit to prevent disturbing forms or reinforcing or segregating concrete.
- D. Clean reinforcement of loose rust, mill scale, dirt, oil, and other materials that could reduce bonding.
- E. Prepare previously placed and existing concrete surfaces by cleaning with steel wire brush and applying bonding agent in accordance with manufacturer's instructions.
- F. Where new concrete is doweled to existing, drill holes in existing concrete, insert steel dowels, and pack holes solid with non shrink grout.

### 3.2 INSTALLATION OF FORMWORK

- A. Construct forms tight to prevent loss of mortar.
- B. Clean contact and screed surfaces of hardened concrete and foreign materials prior to assembly.
- C. Apply form release agent to contact surfaces; follow manufacturer's instructions.

### 3.3 INSTALLATION OF REINFORCEMENT

- A. Bar Reinforcement: In accordance with ACI 301 and CRSI Manual.
- B. Wire Fabric:
  - 1. Install in longest practical length.
  - 2. Offset end laps in adjacent widths to prevent continuous lap.

### 3.4 PLACEMENT OF CONCRETE

- A. Place concrete in accordance with ACI 301 and ACI 318.
- B. Ensure reinforcement, inserts, and embedded parts are not disturbed during concrete placement.
- C. Deposit concrete as nearly as possible in its final position to minimize handling and flowing.

- D. Place concrete continuously between predetermined expansion, control, and construction joints.
- E. Do not place partially hardened, contaminated, or retempered concrete.
- F. Do not allow concrete to free fall over 8 feet; provide tremies, chutes, or other means of conveyance.
- G. Consolidate concrete with mechanical vibrating equipment. Hand compact in corners and angles of forms.
- H. Screed slabs to flatness tolerance of 1/4 inch in 10 feet.

### 3.5 FORM REMOVAL

- A. Remove forming materials in manner that will not damage surfaces of concrete; patch work damaged during form removal operations.
- B. Provide shoring and bracing as required.

### 3.6 PLACEMENT OF GROUT

- A. Remove loose and foreign matter from concrete; lightly roughen bonding surface. Thoroughly wet concrete surfaces; remove excess water.
- B. Mix grout in accordance with manufacturer's instructions. Do not retemper.
- C. Place grout continuously, by most practical means; avoid entrapped air. Do not vibrate grout.

### 3.7 FINISHING

- A. Concealed Formed Surfaces: Leave texture imparted by forms.
- B. Slabs:
  - 1. Finish surfaces in accordance with ACI 301 and ACI 302.1.
  - 2. Finish surfaces as specified in Section 321313.
- C. Allowable Tolerances: In accordance with ACI 301.

### 3.8 PROTECTION

- A. Immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures, and mechanical injury.
- B. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.
- C. Provide artificial heat to maintain temperature of concrete above minimum specified temperature for duration of curing period.
- D. Keep forms sufficiently wet to prevent cracking of concrete or loosening of form joints.

### 3.9 CURING

- A. Cure concrete in accordance with ACI 308:
  - 1. Horizontal surfaces: Use either curing paper or curing compound method.
  - 2. Vertical surfaces: Use either wet curing or curing compound method.

### 3.10 CLEANING

- A. Remove efflorescence, stains, oil, grease, and foreign materials from exposed surfaces.

END OF SECTION