

## SECTION 033001

### CAST-IN-PLACE CONCRETE

#### PART 1 GENERAL

##### 1.01 RELATED WORK SPECIFIED ELSEWHERE

##### 1.02 REFERENCES

- A. Except as shown or specified otherwise, the Work of this Section shall conform to the requirements of Specifications for Structural Concrete for Buildings ACI 301-16 of the American Concrete Institute.

##### 1.03 DEFINITIONS (Amendments to ACI 301, Section 1.2):

- A. Exposed Construction: Exposed to view.

##### 1.04 SUBMITTALS

- A. Submittals Package: Submit product data for design mix(es) and materials for concrete specified below at the same time as a package.
- B. Submit an Environmental Product Declaration (EPD) from the manufacturer for concrete within this specification section, if available. A statement of the contractor's good faith effort to obtain the EPD shall be provided if not available.
  - 1. Manufacturer-provided EPDs must be Product Specific Type III (Third-Party Reviewed), in adherence with ISO 14025 *Environmental labels and declarations*, ISO 14044 *Environmental management – Life cycle assessment*, and ISO 21930 *Core rules for environmental product declarations of construction products and services*.
- C. Shop Drawings: Placing drawings for bar reinforcement.
- D. Product Data:
  - 1. Concrete design mix(es) with name and location of batching plant.
  - 2. Portland Cement: Brand and manufacturer's name.
  - 3. Fly Ash: Name and location of source, and DOT test numbers.
  - 4. Air-entraining Admixture: Brand and manufacturer's name.
  - 5. Water-reducing Admixture: Brand and manufacturer's name.
  - 6. Aggregates: Name and location of source, and DOT test numbers.
  - 7. Lightweight Coarse Aggregate: Brand and manufacturer's name
  - 8. Chemical Hardener (Dustproofing): Brand and manufacturer's name, and application instructions.
  - 9. Bonding Agent (Adhesive): Brand and manufacturer's name, and preparation and application instructions.
  - 10. Expansion Joint Filler: Brand and manufacturer's name.
  - 11. Emery Aggregate: Brand and manufacturer's name, and application instructions.

- E. Samples:
  - 1. Fabric Reinforcement: 8 inches square.
  - 2. Bar Supports: Full size.
- F. Quality Control Submittals:
  - 1. Certificates: Affidavit required under Quality Assurance Article.

## **1.05 QUALITY ASSURANCE**

- A. Concrete batching plant shall be currently approved as a concrete supplier by the New York State Department of Transportation.
- B. Fly ash supplier shall be currently approved as a fly ash supplier by the New York State Department of Transportation.
- C. Certifications: Affidavit by the bar reinforcement manufacturer certifying that bar material meets the contract requirements.
  - 1. Submit evidence consisting of certification of source of material, copies of purchase orders and manufacturer's certifications. For stock material, submit copies of latest mill or purchase orders for material replacement.
    - a. Documentation to confirm compliance with General Conditions Article 25.4 Domestic Steel.
  - 2. Fabricator's and Erector's Qualifications Data: Name and experience of fabricator and erector.
- D. The Contractor agrees, that if the value of this contract exceeds \$100,000 all structural steel, reinforcing steel and other major steel items to be incorporated in the Work of this Contract shall be produced and made in whole or substantial part in the United States, its territories or possessions.
- E. Source Quality Control: The Director reserves the right to inspect and approve the following items, at his own discretion, either with his own forces or with a designated inspection agency:
  - 1. Batching and mixing facilities and equipment.
  - 2. Sources of materials.

## **1.06 STORAGE**

- A. Store materials so as to insure the preservation of their quality and fitness for the Work. Materials, even though accepted prior to storage, are subject to inspection and shall meet the requirements of the Contract before their use in the Work.

## **PART 2 PRODUCTS**

### **2.01 MATERIALS (Amendments to ACI 301, Section 4, for Normal Weight Concrete and Section 7, for Lightweight Concrete):**

- A. Water-reducing Admixture: ASTM C 494, Type A, and on the New York State Department of Transportation's current "Approved List".

- B. Fly Ash (Pozzolans): ASTM C 618, including Table 1A (except for footnote A), Class F except that loss on ignition shall not exceed 4.0 percent.
- C. Chemical Curing and Anti-Spalling Compound: ASTM C-309, Type 1D, Class B, with a minimum 18 percent total solids content. No thinning of material allowed.
  - 1. SureCure Emulsion, Kaufman Products, Inc. 3811 Curtis Avenue, Baltimore, MD 21226, (800) 637-6372.
  - 2. Cure & Seal 25 percent (J-22UV) by Dayton Superior Corp., 1125 Byers Rd., Miamisburg, OH 45342, (800) 745-3700.
  - 3. MasterKure CC 200 WB by Master Builders/ BASF Building Systems, 23700 Chagrin Blvd., Cleveland, OH 44122, (800) 628-9990.
- D. Chemical Hardener (Dustproofing): Colorless aqueous solution of magnesium-zinc fluosilicate. Approved products include:
  - 1. MasterKure HD 300WB by Master Builders/ BASF Building Systems, 23700 Chagrin Blvd., Cleveland, OH 44122, (800) 628-9990.
  - 2. Surfhard by The Euclid Chemical Co., 19218 Redwood Rd., Cleveland, OH 44110, (216) 531-9222.
  - 3. Liqui-Hard by W.R. Meadows, Inc., PO Box 543, Elgin, IL 60121, (847) 683-4500.
  - 4. FluoHard by L & M Construction Chemicals, Inc., 14851 Calhoun Rd., Omaha, NE 68152, (402) 453-6600.
  - 5. Armortop by Anti Hydro International, Inc., 265 Badger Ave., Newark, NJ 07108, (800) 777-1773.
  - 6. Diamond by Kaufman Products, Inc., 3811 Curtis Avenue, Baltimore, MD 21226, (800) 637-6372.
- E. Type 1 Expansion Joint Filler: Preformed, resilient, non-extruding cork units; ASTM D 1752, Type II.
- F. Chamfer Strips: Wood, metal, PVC or rubber; one inch chamfer.
- G. Epoxy Bonding Agent (Adhesive): 100 percent solids epoxy-resin-base bonding compound, complying with ASTM C 881, Types I, II, IV and V, Grade 2 (horizontal areas) or Grade 3 (overhead/vertical areas), and Class B (40-60 degrees Fahrenheit) or Class C (60 degree Fahrenheit and above).
  - 1. SurePoxxy HM Series by Kaufman Products, Inc., 3811 Curtis Avenue, Baltimore, MD 21226, (800) 637-6372.
  - 2. Sikadur Hi-Mod 32 by Sika Corporation, 201 Polito Avenue, Lyndhurst, NJ 07071, (800) 933-7452.
  - 3. MasterEmaco ADH 327 RS by Master Builders/ BASF Building Systems, 23700 Chagrin Blvd., Cleveland, OH 44122, (800) 628-9990.

**2.02 PROPORTIONING (Amendments to ACI 301, Sections 4 & 7):**

- A. Compressive Strength: As required by ACI 318-14 Table 19.3.2.1. "Requirements for concrete by exposure class".
- B. Weight: Normal, except as indicated below:

1. Lightweight Concrete (for floor fills): Air-dry unit weight between 95 and 115 lb/cu ft.
- C. Durability: Concrete shall be air-entrained. Design air content shall be according to ACI 318-14 Table 19.3.2.1 “Requirements for concrete by exposure class”, and ACI 318-14 Table 19.3.3.1 “Total air content for concrete exposed to cycles of freezing and thawing”, with an allowable tolerance of plus or minus 1.5 percent for total air content. Entrained air shall be provided by use of an approved air-entraining admixture. Air-entrained cement shall not be used.
- D. Slump: Maximum 4 inches; minimum 1 inch before the addition of any water-reducing admixtures or high-range water-reducing admixtures (superplasticizers) at the Site.
- E. Admixtures: Do not use admixtures in concrete unless specified or approved in writing by the Director.
- F. Selection of Proportions: Concrete proportions shall be established on the basis of previous field experience or laboratory trial batches, unless otherwise approved in writing by the Director.
  1. Optional Material: Fly ash may be substituted for (Portland) cement in normal weight concrete up to a maximum of 15 percent by weight of the required minimum (Portland) cement. If fly ash is incorporated in a concrete design mix, make necessary adjustments to the design mix to compensate for the use of fly ash as a partial replacement for (Portland) cement.
    - a. Adjustments shall include the required increase in air-entraining admixture to provide the specified air content.
    - b. Lower early strength of the concrete shall be considered in deciding when to remove formwork.

### **2.03 REINFORCEMENT (Amendments to ACI 301, Section 3):**

- A. Bar Reinforcement: ASTM A 615, Grade 60, deformed steel bars.
- B. Fabric Reinforcement: ASTM A 185, welded wire fabric, fabricated into flat sheets unless otherwise indicated.
- C. Bar Supports: Galvanized steel or AISI Type 430 stainless steel, and without plastic tips.
- D. Tie Wire: Black annealed wire, 16-1/2 gage or heavier.

### **2.04 JOINTS AND EMBEDDED ITEMS (Amendments to ACI 301, Section 5.3.2.6):**

- A. Obtain bond at construction joints by the use of bonding agent (adhesive) in accordance w/section 5.2.1.7 or the use of cement grout.

### **2.05 PRODUCTION (Amendments to ACI 301, Section 5):**

- A. Provide ready-mixed concrete, either central-mixed or truck-mixed.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION AND PREPARATION**

- A. Do not use items of aluminum for mixing, chuting, conveying, forming or finishing concrete, except magnesium alloy tools may be used for finishing.
- B. Keep excavations free of water. Do not deposit concrete in water.
- C. Hardened concrete, reinforcement, forms, and earth which will be in contact with fresh concrete shall be free from frost at the time of concrete placement.
- D. Prior to placement of concrete, remove all hardened concrete spillage and foreign materials from the space to be occupied by the concrete.

### **3.02 FORMWORK (Amendments to ACI 301, Section 2):**

- A. The formwork shall be designed for loads, lateral pressure, and allowable stresses outlined in Chapter 4 - Design of "Guide to Formwork for Concrete" (ACI 347-14).
- B. All formwork shall be removed after the concrete has sufficiently hardened, except in inaccessible spaces where approved.
- C. After the ends or end fasteners of form ties have been removed, the embedded portion of the ties shall terminate not less than 3/4 inch from the formed surfaces of concrete.

### **3.03 PLACING REINFORCEMENT (Amendments to ACI 301, Section 3):**

- A. At the time concrete is placed, reinforcement shall be free of mud, oil, loose rust, loose mill scale, and other materials or coatings that may adversely affect or reduce the bond.

### **3.04 PLACING CONCRETE (Amendments to ACI 301, Section 5):**

- A. Operation of truck mixers and agitators and discharge limitations shall conform to the requirements of ASTM C 94.
- B. Do not allow concrete to free fall more than 4 feet.

### **3.05 FINISHING FORMED SURFACES (Amendments to ACI 301, Section 5.3.3):**

- A. Finish Schedule: Except where indicated otherwise on the Drawings, provide the finishes below:
  - 1. Rough Form Finish for concrete surfaces not exposed to view.
  - 2. Smooth Form Finish for concrete surfaces exposed to view.

**3.06 FINISHING SLABS (Amendments to ACI 301, Section 5.3.4):**

- A. Finish Schedule: Except where indicated otherwise on the Drawings, provide the finishes below:
  - 1. Floated Finish for:
    - a.
    - b. Slabs and fill over which waterproofing, roofing, vapor barrier, insulation, terrazzo, or resin bound flooring is required.
- B. Finishing, General: Provide monolithic finishes on concrete floors and slabs without the addition of mortar or other filler material. Finish surfaces in true planes, true to line, with particular care taken during screeding to maintain an excess of concrete in front of the screed so as to prevent low spots. Screed and darby concrete to true planes while plastic and before free water rises to the surface. Do not perform finishing operations during the time free water (bleeding) is on the surface.

**3.07 CURING AND PROTECTION (Amendments to ACI 301, Section 5.3.6):**

- A. Maintain concrete surfaces in a moist condition for at least 7 days after placing, except where otherwise indicated. Do not use curing compound.

**3.08 CHEMICAL HARDENER (DUSTPROOFING)**

- A. Apply chemical hardener to all troweled finished interior floors which are to be left exposed.
- B. Do not apply chemical hardener until concrete has cured the number of days recommended in manufacturer's instructions.
- C. Prepare surfaces and apply chemical hardener in accordance with manufacturer's printed instructions and recommendations.

**3.09 FIELD QUALITY CONTROL (Amendments to ACI 301, Section 1):**

- A. Make available to the Director's Representatives whatever test samples are required to make tests. Furnish shipping boxes for compression test cylinders.

**END OF SECTION**