

**Division 3**  
Concrete



SECTION 03001 - CONCRETE

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Formwork, reinforcement, accessories, cast-in-place concrete, finishing and curing.
- B. Concrete Waterproofing Ad-Mixture.

1.2 SUBMITTALS

- A. Shop Drawings: Indicate pertinent dimensioning, form materials, schedule of erection and stripping.
- B. Indicate reinforcement sizes, spacings, locations, and quantities, bending and cutting schedules, supporting and spacing devices.
- C. Product Data: Indicate admixtures, patch compounds, curing compounds, water stops, joint systems and anchors.

1.3 QUALITY ASSURANCE

- A. Construct and erect concrete formwork in accordance with ACI 301 "Specifications for Structural Concrete for Buildings".
- B. Perform concrete reinforcing work in accordance with ACI 318 "Building Code Regulations for Reinforced Concrete". CRSI 63, 65, and Manual of Practice.
- C. Perform cast-in-place concrete work in accordance with ACI 301, ACI 318.
- D. Prepare shop drawings under seal of Professional Structural Engineer registered in the State of Florida.

PART 2 - PRODUCTS

2.1 FORM MATERIALS AND ACCESSORIES

- A. Plywood for Exposed Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood, "Class I, Exterior Grade, mill oiled and edge sealed.
- B. Forms for Unexposed Concrete: Provide plywood, lumber or acceptable material. Provide lumber dressed or at least two (2) edges and one (1) side for tight fit.

- C. Pan Type: Steel; of size and profile required.
- D. Form Ties: Removable.
- E. Waterstops: Rubber.
- F. Flashing Reglets: Galvanized steel, with alignments splines for joints.
- G. Form Release Agent: Colorless mineral oil which will not stain concrete.
- H. Slab Edge Joint Filler: ASTM D 1751, Premolded asphaltic board, 1/2 inch.
- I. Vapor Retarder: 6 mil thick clear polyethylene film, type recommended for below grade application.

## 2.2 REINFORCEMENT MATERIALS

- A. Reinforcing Steel: ASTM A 615, yield grade; deformed billet steel bars, plain finish.
- B. Welded Steel Wire Fabric: ASTM A 185 Plain type.
- C. Chairs, Bolsters, Bar Supports, Spacers: Plastic tipped, sized and shaped for support of reinforcing.
- D. Steel Wire: ASTM A 82, plain, cold-drawn steel.
- E. Fabricate concrete reinforcing in accordance with ACI 315, ACI 318, ASTM A 184.

## 2.3 CONCRETE MATERIALS

- A. Portland Cement: ASTM C150, Normal-Type I.
- B. Normal Weight Aggregates: ASTM C 33.
- C. Water: Potable.
- D. Air Entrainment Admixture: ASTM C 260.
- E. Water-Reducing Admixture: ANSI/ASTM C 494, Type A and contain not more than 1% chloride ions.
  - 1. Products: Subject to compliance with requirements, provide one of the following:

"Pozzolith 322N"; Master Builders

"Plastocrete 160", Sika Chemical Corporation

"Chemstard", Chem-Masters Corporation

- F. High-Range Water-Reducing Admixture (Super Plasticizer): ASTM C 494, Type F of the sulfonated melamine formaldehyde condensate based materials type and contain not more than 1% chloride ions.
- G. Water-Reducing, Retarding Admixture: ASTM C 494, Type D and contain not more than 1% chloride ions.
- H. Calcium Chloride not permitted.
- I. Abrasive non-skid topping - AO Grip-it by L & M, Frictex NS by Sonneborn, ToxGrip by Toch.
- J. Bonding Compound - non-reversible acrylic. Everbond by L & M Acryl 600 by Price Research, Sika Bond by Sika.
- K. Epoxy Bonding Adhesive - Bond - 1 by Permagine, Hi-Mod by Sika, Epobond by L & M. Adhesive shall be used to eliminate cold joints, 2 part, 100% solids for use on DAMP or DRY surfaces.
- L. For Release Agent - shall non-transferring, non-staining and 100% chemically active. "DeBond" by L & M, "Magic Coat" by Nox-Crete and "Pro-Cote" by Protex.
- M. Patching & Repair Mortar - one component, fiber-reinforced, rapid setting and non shrinking. Shall be non-corrosive and resist sulfate attack. Durapatch by L & M, Set 45 by Set Products, Sonoset by Sonneborn.
- N. High Hydrostatic Heads Capillary Waterproofing - for NEGATIVE SIDE "hot patch" active leaks, foundation leaks, etc. Product shall be EPA approved for potable water, non-toxic rated by HSLA standards. Permaquick by Permagine, Vandex by Vandex Corp. and Zypex Products, Inc.
- O. Curing:
1. Moisture-Retaining Cover: Waterproof paper or polyethylene film complying with ANSI/ASTM C 171.
  2. Liquid Membrane-Forming Curing Compound: Liquid type membrane forming compound complying with ANSI/ASTM C 309, type I, Class A with minimum 30% solids content unless other type acceptable to Architect.
    - a. Products: Subject to compliance with requirements, provide one of the following:
      - "Masterseal", Master Builders
      - "Clear Seal", W.R. Grace

"Kure-N-Seal", Sonneborn Contech

"L & M Cure", Construction Chemicals

"Hardtop", Gifford - Hill

P. Provide (KIM) Waterproofing Admixture to 11th floor slab mix (PH).

1. Manufacturer: Kryton International Inc., (604) 324-8280, POC: Ian Scott.

#### 2.4 PROPORTIONING AND DESIGN OF MIXES

A. Mix designs for each strength of concrete required shall be prepared by an independent testing laboratory and submitted to the Architect for his approval. No concrete shall be poured until Architects approval has been received.

B. Design mixes to provide normal weight concrete with the following properties, as indicated on drawings and schedules:

1. 3000 psi 28-day compressive strength, 480 lbs. Cement per cu. Yd. Minimum, W/C ratio, 0.58 maximum.
2. 2500 psi 28-day compressive strength. 440 lbs. Cement per cu. Yd. Minimum, W/C ratio, 0.65 maximum.
3. 6000 psi 28-day compressive strength; see structural drawings.
4. See Structural Drawings for other requirements.

C. Adjustments to Concrete Mixes: Mix design adjustments may be requested by Contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant, at no additional cost to Owner and as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in work.

D. Admixtures:

1. Use air-entraining admixture in all concrete, unless otherwise indicated. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having air content of 2% to 4%.

E. Slump Limits: Proportion and design mixes to result in concrete slump at point of placement as follows:

1. Ramps and Sloping Surfaces: Not more than 3".
2. Reinforced Foundation Systems: Not less than 1" and not more than 3".
3. Concrete containing HRWR admixture (super plasticizer): Not more than 8".
4. Other Concrete: Not less than 1" and not more than 4".

## 2.5 CONCRETE MIXING

- A. Ready-Mix Concrete: Comply with requirements of ASTM C 94, and as herein specified.
  - 1. Do not add additional water to the batch without the approval of the Architect.
- B. During hot weather, or under conditions contributing to rapid setting of concrete, a shorter mixing time than specified in ASTM C 94 may be required.
  - 1. When air temperature is between 85 degrees F (30 degrees C) and 90 degrees F (32 degrees C) reduce mixing and delivery time from 1 ½ hours to 75 minutes, and when air temperature is above 90 degrees F (30 degrees C) reduce mixing and delivery time to 60 minutes.
- C. Job Site Mixing: Mix materials for concrete in appropriate drum type batch machine mixer. For mixer of one cubic yard, or smaller capacity, continue mixing at least 1½ minutes, but not more than 5 minutes after ingredients are in mixer, before any part of the batch is released. For mixers of capacity larger than one cubic yard, increase minimum 1 ½ minutes of mixing time by 15 seconds for each additional cubic yard or fraction thereof.
  - 1. Provide batch ticket for each discharged and used in work, indicating project identification name and number, date, mix type, quantity and amount of water introduced.

## PART 3 - EXECUTION

### 3.1 FORMWORK ERECTION

- A. Erect formwork, shoring and bracing to achieve design requirements.
- B. Camber slabs and framing to achieve ACI 301 tolerances.
- C. Provide bracing to ensure stability of formwork.
- D. Provide chamfer strips on external corners of beams and columns.
- E. Apply form release agent to formwork in accordance with manufacturer's instructions, prior to placing for accessories and reinforcement.
- F. Do not apply form release agent where concrete surfaces will receive special finishes applied coverings which are affected by agent.
- G. Clean forms as erection proceeds, to remove foreign matter.

### 3.2 INSERTS, EMBEDDED COMPONENTS AND OPENINGS

- A. Provide formed openings where required for work to be embedded in and passing through concrete members.
- B. Coordinate work of other sections in forming and setting openings, slots, recesses, chases, sleeves, bolts, anchors and other inserts.
- C. Install concrete accessories straight, level and plumb.
- D. Install waterstops continuous without displacing reinforcement.
- E. Place formed construction joint device in floor slab. See Drawings for locations.
- F. Place joint filler at perimeter of floor slab, penetrations, isolation joints and as shown on Drawings.
- G. Install void forms in accordance with manufacturer's instructions. Protect forms from moisture before concrete placement and from crushing during concreting.

### 3.3 REINFORCEMENT PLACEMENT

- A. Place reinforcement, supported and secured against displacement.
- B. Ensure reinforcing is clean, free of loose scale, dirt or other foreign coatings.

### 3.4 PLACING CONCRETE

- A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Apply bonding agent in accordance with manufacturer's instructions.
- B. Install vapor retarder under interior slabs on grade. Lap joints minimum 6 inches and seal watertight.
- C. Separate slabs-on-grade from vertical surfaces with ½ inch thick joint filler, extended from bottom of slab to within ¼ inch of finished slab surface.
- D. Place concrete continuously between predetermined expansion, control and construction joints.
- E. Place floor slabs in saw cut pattern indicated.
- F. Where new concrete is dowelled to existing work, drill holes in existing concrete, insert steel dowels and pack with non-shrink grout.
- G. Screed floors, slabs-on-grade and concrete for toppings level.

### 3.5 FORM REMOVAL

- A. Do not remove forms or bracing until concrete has gained sufficient strength to carry its own weight and imposed loads.
- B. Remove formwork progressively and in accordance with code requirements.
- C. Refer to Structural Drawings for concrete strength requirements.

### 3.6 SEPARATE FLOOR TOPPINGS

- A. Place concrete floor toppings to required lines and levels.
- B. Prior to placing, remove deleterious material. Broom and vacuum clean.
- C. Place required dividers edge strips, reinforcing and other items to be cast in.

### 3.7 FLOOR FINISHING

- A. Finish concrete floor surfaces in accordance with ACI 301 and ACI 302.
- B. Uniformly spread, screed, and float concrete.
- C. Wood float surfaces which will receive quarry tile, ceramic tile with full bed setting system.
- D. Steel trowel surfaces which will receive carpeting, resilient flooring, seamless flooring, thin set quarry tile, thin set ceramic tile or which will be left exposed.
- E. Maintain surface flatness, with maximum variation of 1/8 inch in 10 ft.
- F. In areas with floor drains, maintain floor level at walls and slope surfaces uniformly to drains.
- G. Apply concrete hardener on floor surfaces as scheduled. Apply in accordance with manufacturer's instructions.

### 3.8 CURING

- A. Apply sealer on floor surfaces in accordance with manufacturer's instructions.
- B. Immediately after placement, protect concrete from premature drying.
- C. Maintain concrete with minimal moisture loss at relatively constant temperature for period necessary for hydration of cement and hardening of concrete.

3.9 FIELD QUALITY CONTROL

- A. Three (3) Concrete Test Cylinders: Taken for every 100 or less cu yards of concrete placed.
- B. One (1) Additional Test Cylinder: Taken during cold weather concreting, and be cured on job site under same conditions as concrete it represents.
- C. One (1) Slump Test: Taken for each set of test cylinders taken.

3.10 DEFECTIVE CONCRETE

- A. Modify or replace concrete not conforming to required lines, details and elevations, as directed by Architect/Engineer.

END OF SECTION 03001