

SECTION 03300
CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.1 SECTION INCLUDES:

- A. Cast-in-place concrete building frame members, floors, shear walls, elevator shaft walls, foundation walls, footings, and supported slabs.
- B. Floors and slabs on grade.
- C. Control, expansion and contraction joint devices associated with concrete work, including joint sealants.
- D. Equipment pads, light pole base, flagpole base, thrust blocks, and manholes.

1.2 REFERENCES

- A. ACI 211.1 - Selecting Proportions for Normal, Heavyweight, and Mass Concrete
- B. ACI 211.2 - Selecting Proportions for Structural Lightweight Concrete
- C. ACI 301 - Structural Concrete for Buildings
- D. ACI 302 - Guide for Concrete Floor and Slab Construction.
- E. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing Concrete
- F. ACI 305R - Hot Weather Concreting.
- G. ACI 306R - Cold Weather Concreting.
- H. ACI 308 - Standard Practice for Curing Concrete
- I. ACI 318 - Building Code Requirements for Structural Concrete
- J. ASTM B221 - Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
- K. ASTM C33 - Concrete Aggregates
- L. ASTM C39 - Test Method for Compressive Strength of Cylindrical Concrete Specimens
- M. ASTM C94 - Ready-Mixed Concrete
- N. ASTM C150 - Portland Cement
- O. ASTM C260 - Air Entraining Admixtures for Concrete
- P. ASTM C330 - Light Weight Aggregates for Structural Concrete
- Q. ASTM C494 - Test Method for Chemical Admixtures for Concrete
- R. ASTM C618 - Fly Ash and Raw or Calcinated Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete
- S. ASTM C948 - Test Method for Dry and Wet Bulk Density, Water Absorption and Apparent Porosity of Thin Sections of Glass-Fiber-Reinforced Concrete
- T. ASTM C1017 - Flowing Concrete
- U. ASTM D994 - Preformed Expansion Joint Filler for Concrete (Bituminous Type).
- V. ASTM D1190 - Concrete Joint Sealer, Hot-Poured Elastic Type
- W. ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction (Non-extruding and Resilient Bituminous Types).
- X. ASTM D1752 - Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction.
- Y. Florida Building Code.
- Z. Florida Department of Transportation - Standard Specifications for Road and Bridge Construction
- AA. ASCE 7-98 - Minimum Design Loads for Buildings and other Structures.

1.3 RELATED SECTIONS

- A. 02200 Earth Work
- B. 02280 Soil Treatment for Termite Control
- C. 03100 Concrete Formwork
- D. 07191 Vapor Retarders

1.4 SUBMITTALS FOR REVIEW

- A. Section 01300 - Submittals: Procedures for submittals
- B. Product Data: Provide data on joint devices, attachment accessories, admixtures, curing compound, sealers, and integral coloring.
- C. Samples: Submit two 12" long samples of expansion/contraction joint and control joint.

1.5 SUBMITTALS FOR INFORMATION

- A. Section 01300 - Submittals: Procedures for submittals
- B. Manufacturer's Installation Instructions: Indicate installation procedures and interface required with adjacent Work.

1.6 SUBMITTALS AT PROJECT CLOSEOUT

- A. Section 01700 - Contract Closeout: Procedures for submittals.
- B. Accurately record actual locations of embedded utilities and components that are concealed from view.

1.7 DESIGN REQUIREMENTS

- A. Design in conformance with Florida Building Code, ACI 318 and ACI 301.
- B. Provide expansion joints, control joints, construction joints, and isolation joints to prevent uncontrolled stress cracks in the structure and according to the latest engineering standards.

1.8 QUALITY ASSURANCE

- A. Perform Work in accordance with ACI 301.
- B. Mix and deliver ready mixed concrete in accordance with ASTM C94.
- C. Maintain one copy of each document on site.
- D. Acquire cement and aggregate from same source for all work.
- E. Conform to ACI 305R when concreting during hot weather.
- F. Conform to ACI 306R when concreting during cold weather.

1.9 MOCK-UP

- A. Section 01400 - Quality Control: Requirements for mock-up.
- B. Construct and erect a field sample for architectural concrete surfaces receiving special treatment or finish as result of formwork.
- C. Sample Panel: Sufficient size to indicate special treatment or finish required.
- D. If requested by A/E, cast concrete against sample panel. Obtain acceptance of resultant surface finish prior to erecting formwork.

- E. Accepted sample panel is considered basis of quality for the finished work. Keep sample panel exposed to view for duration of concrete work.
- F. Locate where directed.
- G. Mock-up may not remain as part of the Work.

PART 2 PRODUCTS

2.1 CONCRETE MATERIALS

- A. Cement: ASTM C150, Type I - Normal, Portland type.
- B. Fine and Coarse Aggregates: ASTM C33.
- C. Lightweight Aggregate: ASTM C330.
- D. Water: Clean and not detrimental to concrete.
- E. Glass Fiber Reinforcement: ASTM C948.

2.2 ADMIXTURES

- A. Air Entrainment: ASTM C260.
- B. Chemical: ASTM C494: 1. Water Reducing - Type A; 2. Retarding - Type B; 3. Accelerating - Type C; 4. Water Reducing and Retarding - Type D; 5. Water Reducing and Accelerating - Type E; 6. Water Reducing, High Range - Type F; 7. Water Reducing, High Range and Retarding - Type G; 8. Flowing Concrete - ASTM C1017.
- C. Fly Ash: ASTM C618.

2.3 ACCESSORIES

- A. Bonding Agent: Polymer resin emulsion, Polyvinyl Acetate, Latex emulsion, Two component modified epoxy resin, Non-solvent two component polysulfide epoxy, Mineral filled polysulfide polymer epoxy, Mineral filled polysulfide polymer epoxy resin, Versamid cured epoxy.
- B. Vapor Barrier: Flexible, sandwich of heavy paper, reinforced fibers, and two layers of inert polyethylene, formed into one layer under heat and pressure. Perm rating of 0.1.
- C. Non-Shrink Grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2,400 psi in 48 hours and 7,000 psi in 28 days.

2.4 JOINT DEVICES AND FILLER MATERIALS

- A. Joint Filler: ASTM D1751; Asphalt impregnated fiberboard or felt.
- B. Joint Filler: ASTM D1752; Closed cell polyvinyl chloride foam, resiliency recovery of 95% if not compressed more than 50% of original thickness.
- C. Construction Joint Devices: Integral galvanized steel; formed to tongue and groove profile, with removable top strip exposing sealant trough, ribbed steel spikes with tongue to fit top screed edge.
- D. Expansion and Contraction Joint Devices: ASTM B221 alloy, extruded aluminum; resilient elastomeric filler strip with a Shore A hardness of 35 to permit plus or minus 25% joint movement with full recovery; extruded aluminum cover plate, of longest manufactured length at each location, flush mounted; color as selected.
- E. Sealant and Primer: Type, as specified in Section 07900.

- F. Sealant: Cold applied.

2.5 CONCRETE MIX

- A. Mix concrete in accordance with ACI 304. Deliver concrete in accordance with ASTM C94.
- B. Select proportions for normal weight concrete in accordance with ACI 301 Method 3.
- C. Select aggregate proportions for lightweight concrete in accordance with ASTM C330.
- D. Use accelerating admixtures in cold weather only when approved by A/E. Use of admixtures will not relax cold weather placement requirements.
- E. Use set retarding admixtures during hot weather only when approved by A/E.
- F. Add air-entraining agent to normal weight concrete mix for work exposed to exterior.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Verify site conditions under provisions of Section 01039.
- B. Verify requirements for concrete cover over reinforcement.
- C. Verify that anchors, seats, plates, reinforcement and other items to be cast into concrete are accurately placed, positioned securely, and will not cause hardship in placing concrete.

3.2 PREPARATION

- A. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent in accordance with manufacturer's instructions.
- B. In locations where new concrete is dowelled to existing work, drill holes in existing concrete; insert steel dowels and pack solid with non-shrink grout.
- C. Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.
- D. Remove all foreign matter and water from forms or structural excavations.

3.3 FORMWORK

- A. Conform to ACI 347
- B. Foundations shall be formed. Earth forms not allowed, unless engineer can provide information to building official showing the soil conditions are conducive to earth forms.

3.4 PLACING CONCRETE

- A. Place concrete in accordance with ACI 301.
- B. Notify A/E minimum 24 hours prior to commencement of operations.
- C. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints are not disturbed during concrete placement.
- D. Treat for termites per section 02280.
- E. Install vapor retarder under interior slabs on grade, lap joints minimum 6 inches and seal watertight by taping edges and ends.
- F. Repair vapor retarder damaged during placement of concrete reinforcing. Repair with vapor retarder material; lay over damaged areas minimum 6 inches and seal watertight.
- G. Separate slabs on grade from vertical surfaces with joint filler.

- H. Place joint filler in floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- I. Extend joint filler from bottom of slab to within ¼" of finished slab surface. Conform to Section 07900 for finish joint sealer requirements.
- J. Install joint devices in accordance with manufacturer's instructions.
- K. Install construction joint devices in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.
- L. Install joint device anchors. Maintain correct position to allow joint cover to be flush with floor and wall finish.
- M. Install joint covers in one-piece length, when adjacent construction activity is complete.
- N. Apply sealants in joint devices in accordance with Section 07900.
- O. Maintain records of concrete placement. Record date, location, quantity, air temperature, and test samples taken.
- P. Place concrete continuously between predetermined expansion, control, and construction joints.
- Q. Do not interrupt successive placement; do not permit cold joints to occur.
- R. Place floor slabs in checkerboard or saw cut pattern indicated.
- S. Saw cut joints within 24 hours after placing. Use $\frac{3}{16}$ " thick blade, cut into ¼ depth of slab thickness.
- T. Screed floors and slabs on grade level, maintaining surface flatness of maximum ⅛" in 10'.

3.5 SEPARATE FLOOR TOPPINGS

- A. Prior to placing floor topping, roughen substrate concrete surface and remove deleterious material. Broom and vacuum clean.
- B. Place required dividers, edge strips, reinforcing, and other items to be cast in.
- C. Apply bonding agent to substrate in accordance with manufacturer's instructions.
- D. Place concrete floor toppings to required lines and levels. Place topping in checkerboard panels with dimensions not exceeding 20'.
- E. Screen toppings level, maintaining surface flatness of maximum 1:1000.

3.6 CONCRETE FINISHING

- A. Provide formed concrete surfaces to be left exposed, concrete walls, columns, beams, joists, with smooth rubbed finish.
- B. Finish concrete floor surfaces in accordance with ACI 301.
- C. Wood float surfaces that will receive quarry tile, ceramic tile, and terrazzo with full bed setting system.
- D. Steel trowel surfaces that receive carpeting, resilient flooring, seamless flooring, thin-set quarry tile, and thin set ceramic tile.
- E. Steel trowel surfaces scheduled to be exposed.
- F. In areas with floor drains, maintain floor elevation at walls; pitch surfaces uniformly to drains at 1:50 nominal.

3.7 CURING AND 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. Cure floor surfaces in accordance with ACI 308.
- D. Ponding: Maintain 100% coverage of water over floor slab areas continuously for 4 days.
- E. Spraying: Spray water over floor slab areas and maintain wet for 7 days.

3.8 FIELD QUALITY CONTROL

- A. Section 01400 - Quality Assurance: Field inspection, testing, adjusting, and balancing.
- B. Provide free access to Work and cooperate with appointed firm.
- C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of Work.
- D. Tests of cement and aggregates may be performed to ensure conformance with specified requirements.
- E. Three concrete test cylinders shall be taken for every 75 cu yards or less of each class of concrete placed.
- F. One additional test cylinder shall be taken during cold weather concreting, cured on job site under same conditions as concrete it represents.
- G. One slump test shall be taken for each set of test cylinders taken.

3.9 PATCHING

- A. Allow A/E to inspect concrete surfaces immediately upon removal of forms.
- B. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify A/E upon discovery.
- C. Patch imperfections in accordance with ACI 301.

3.10 DEFECTIVE CONCRETE

- A. Defective Concrete: Concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. A/E shall determine the repair or replacement of defective concrete.
- C. Do not patch, fill, touch-up, repair, or replace exposed concrete except upon express direction of A/E for each individual area.

END OF SECTION