

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Cast-in-place concrete.
- B. Concrete slabs on grade, footings and curbs for walls.
- C. Control, expansion and contraction joint devices associated with concrete work including joint sealants.
- D. Related Sections
 - 1. Section 031000, Concrete Formwork
 - 2. Section 032000, Concrete Reinforcement
 - 3. Section 033900, Concrete Curing
 - 4. Section 321313, Sitework Concrete

1.2 REFERENCES

- A. CBC - 2016 California Building Code
 - 1. CBC-19 - CBC Chapter 19, Concrete
- B. ADA - Americans with Disabilities Act of 1990
- C. ADA/Standards - ADA Title II Regulations and the DOJ/Standards for Accessible Design
- D. ACI 301 - Structural Concrete for Buildings.
- E. ACI 318-2014 - Building Code Requirements for Structural Concrete and Commentary.
 - 1. ASTM C33 - Concrete Aggregate.
 - 2. ASTM C150 - Portland Cement.
- F. ASTM C171 - Sheet Materials for Curing Concrete.
- G. ASTM C1107 - Packaged Dry, Hydraulic - Cement Grout (Nonshrink).
- H. ASTM C1116 - Specification for Fiber-Reinforced Concrete.
- I. ASTM D1751 - Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Bituminous Type).
- J. ASTM E96 - Water Vapor Transmission of Materials.
- K. CSS - Caltrans Standard Specifications, Latest Edition.

1.3 SUBMITTALS

- A. Placement Schedule: Submit for approval details and/or sketches showing location of each proposed construction joint. Do not deviate from locations of horizontal joints indicated on drawings.
- B. Product data for each type of manufactured material and product included.
- C. Design mix for each concrete mix.
- C. Steel reinforcement shop drawings, including material, grade bar schedules, spacing, bent bar diagrams, arrangement and supports.
- D. Submit contraction (crack control) joint, expansion, isolation and construction joint layout to Architect for approval.

1.4 PROJECT RECORD DOCUMENTS

- A. Accurately record actual locations of embedded utilities and components that are concealed from view.
- B. Maintain an accurate record showing date and time of concrete placement in each portion of structure. Correlate placing record for test cylinders made by testing laboratory. Maintain a separate record giving date of removal of forms, shoring, including first and second halves and reshoring, if used. Keep records available for inspection at site. Upon completion, deliver two copies of each to Architect in approved form.

1.5 QUALITY ASSURANCE

- A. Perform Work in accordance with Section 1905, California Building Code, and ACI 318.1 and 318.3.
- B. Maintain one copy of all records.
- C. Acquire cement and aggregate from same source for all work.
- D. Conform to ACI Chapter 26.5.5 and ACI 305R when concreting during hot weather. No concrete placement permitted above 90 degrees Fahrenheit. Limit concrete temperature to 95 degrees Fahrenheit.
- E. Conform to ACI Chapter 26.5.4 and ACI 306R when concreting during cold weather. No concrete placement permitted below 50 degrees Fahrenheit.

1.6 COORDINATION

- A. Coordinate the placement of joint devices with erection of concrete formwork and placement of form accessories.

PART 2 - PRODUCTS

2.1 CONCRETE MATERIALS

- A. Cement: ASTM C150, Type II. Portland Cement Type, conforming to Section 1903A, California Building Code.
- B. Aggregates:
 - 1. Aggregate for Stone Concrete: ASTM C33.
 - 2. Aggregate for Lightweight Concrete: ASTM C330.
- C. Conform to requirements on structural drawings for maximum size of aggregate permitted in individual applications.
- D. Water: Clear, from potable source, and not detrimental to concrete.

2.2 ACCESSORIES

- A. Bonding Agent: ASTM C631, Polyvinyl Acetate Latex emulsion; HIBOND, manufactured by Lambert Corporation, Orlando FL, LOCK BOND NO. 906, manufactured by Macklanburg-Duncan Co., City of Industry, CA, or equal as approved in accordance with Division 01, General Requirements for Substitutions.
- ~~B. Curing Film: ASTM C171; 10 mil thick, clear polyethylene film, single sheet, manufactured from virgin resin with no scrap or additives, free of visible defects, uniform in appearance, conforming to the following:
 - ~~1. Moisture Loss: 0.055 g per sq. cm.~~
 - ~~2. Tensile Strength: 1700 psi longitudinal, 1200 psi transverse.~~
 - 3. Elongation: 225 percent longitudinal, 350 percent transverse.~~
- C. Non-Shrink Grout: ASTM C1107, Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 5,000 psi in 24 hours and 8,000 psi in 7 days; of consistency suitable for application and a 30 minute working time.
- D. Vapor Barrier at interior slabs: ASTM E 1745, Class A, 15 mils thick, Permeance as tested before and after mandatory conditioning (ASTM E 1745 Section 7.1 and subparagraphs 7.1.1 - 7.1.5): less than 0.01grains/(ft² · hr · inHg). WVTR less than or equal to 0.012 perms as tested by ASTM E: 96
 - 1. Acceptable Products
 - a. 15 mil Stegowrap Vapor Barrier, Stego Industries LLC
 - b. Reef Industries, VaporGuard
 - c. W.R. Meadows Premoulded membrane with plasmatic core.
 - d. Or equal, as approved in accordance with Division 01 requirements for substitutions.
- E. Reinforcement: In accordance with Section 032000.

- F. Concrete Formwork: In accordance with Section 03 10 00.

2.3 JOINT DEVICES AND FILLER MATERIALS

- A. Expansion Joint Filler - ASTM D1751: Close cell bituminous saturated fiberboard, 1/2 inch thick; Fiber Expansion Joint manufactured by American Highway Technology, Kankakee, IL, W. R. Meadows, or approved equal.
- B. Expansion Joint Top: Integral extruded polystyrene plastic; 1/2 inch thick, with removable top strip exposing sealant trough, JOINT CAPS manufactured by The Burke Company, or equal as approved in accordance with Division 01, General Requirements for substitutions.
- C. Joint Backing: ASTM C1330, Cylindrical, Type C, closed cell, polyethylene backer rod; oversized 30 to 50 percent larger than joint width. Green Rod by Nomaco Inc. or equal.
- D. Sealant: Polyurethane multi-component type, non-sagging or self leveling at flatwork, as specified in Section 07 92 00.
- E. Primer: As recommended by sealant manufacturer.
- F. Saw-Cut Joint Filler: Two-component epoxy resin, gray color, non-hardening, self-leveling, SIKADUR 51 (SL), by Sikacorp., Lyndhurst, NJ, or equal as approved in accordance with Division 01 General Requirements for Substitutions.

2.4 CONCRETE MIX

- A. Mix and deliver concrete in accordance with Section 1905, California Building Code.
- B. Deliver concrete in transit mixers only. Discharge loads in less than 1-1/2 hours after water is first added.
 - 1. Design Mix: ACI 318 Chapter 26. Ingredients and proportions for design mix shall be selected by a DSA-approved Testing Laboratory certified by a registered civil engineer licensed in California.
 - 2. Required Strength: As noted on the structural drawings.
 - 3. Select proportions by volume for concrete in accordance with the approved design mix.
 - 4. All mix designs for this project shall include a 15% flyash substitute for cement by volume. Class "C" flyash is not permitted.
 - 5. Do not exceed water-cement ratios by weight for concrete items as specified on the structural drawings.
 - 6. Comply with structural drawings for other limitations to each mix design specified.
 - 7. Miscellaneous Sitework Concrete: Specified in Section 32 13 13, Sitework Concrete.

2.5 GROUT MIX

- A. 1:3:2 parts Portland Cement, to sand, to pea gravel, at minimum 2000 psi at 28 days.

2.6 DRYPACK

- A. Cement/sand mix of consistency to pack dry below base plates and other components as specified. Minimum 5,000 psi.
- B. Alternate flowable cementitious fill material may be used if properly dammed and consolidated below components. Minimum 5,000 psi.

~~2.7 GRANULAR FILL~~

- ~~A. Crushed Aggregate Base (capillary break): 3/4 inch maximum grading, crushed rock and rock dust conforming to requirements of Section 200-2.2, SSPWC, with 3/8 inch sieve requirement waived, or Class 2 Aggregate Base as defined in Section 26, CSS.~~

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify site conditions.
- B. Verify compaction has been completed per specifications.
- C. Verify requirements for concrete cover over reinforcement.
- D. 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 sandblasting to remove laitance and expose clean aggregate.
- B. In locations where new concrete is doweled to existing work, drill and clean holes in existing concrete in accordance with the ICC ESR report specified on the structural drawings for the type of epoxy indicated. All non-structural epoxy dowel applications require IOR inspection during installation. All structural epoxy dowel applications will be subject to "special inspection and testing" at Structural Engineer's direction.
- C. When approved by the Architect, clean previously placed concrete with steel brush and apply bonding agent in accordance with manufacturer's instructions.
- D. ~~Under Interior Slabs on Grade: Install 4 inches thick crushed aggregate base per Section 200-2.2, SSPWC or Class 2 CCS as capillary break. Over aggregate base place 15 mil vapor barrier in largest practical sections. Seal all 6 inch lapped seams, penetrations and foundation perimeters using manufacturer approved tape only and install per manufacturer instructions. Install pipe boots at pipe penetrations. Install reinforcement and concrete as scheduled. Install 1 1/2" of coarse, washed sand over Vapor Barrier.~~
 - 1. Installation of vapor barrier shall be in accordance with ASTM E 1643 and manufacturer's instructions.

2. Tapes, mastics, sealants, and other products used with vapor barrier shall be from same manufacturer as, and certified compatible with, vapor barrier.

E. Install steel reinforcing per Section 03 20 00.

3.3 PLACING CONCRETE

A. Place concrete in accordance with ACI 318 Section 26.5.2. Remove loose dirt from excavations.

B. Notify Architect minimum 24 hours prior to commencement of operations. All excavations, forms and reinforcing shall be inspected and approved by the "special inspector" and Architect prior to placement.

C. Ensure reinforcement, inserts, embedded parts, formed joint fillers, joint devices and accessories are not disturbed during concrete placement.

D. Install joint fillers, primer and sealant in accordance with manufacturer's instructions.

E. When detailed on the drawings, separate slabs on grade from vertical surfaces with 1/2 inch thick joint filler.

F. Extend joint filler from bottom of slab to within 1/2 inch of finished slab surface using two-component polyurethane sealant as specified in Section 07 92 00.

G. Install joint devices in accordance with manufacturer's instructions as detailed.

H. Install construction joint device in coordination with floor slab pattern placement sequence. Set top to required elevations. Secure to resist movement by wet concrete.

I. Maintain joint device in correct position to allow joint cover flush with finish. J. Install joint covers in longest practical length.

J. Place concrete continuously between predetermined expansion, control and construction joints.

1. Install expansion joints at vertical concrete walls at 24 feet on center unless noted otherwise on drawings.

2. Retaining Walls at Buildings: install waterstops in expansion joints to form a continuous waterproofed wall surface condition. Support and protect exposed waterstops during progress of the Work.

K. Do not interrupt successive placement; do not permit cold joints to occur.

L. Avoid segregation of materials. Perform vibrating so as to produce a dense, smooth application free of rock pockets and voids. Do not use vibrators to move concrete horizontally.

M. Provide special mix prepared by the Testing Laboratory and approved by the Architect utilizing smaller aggregates in areas of reinforcing congestion to prevent the formation of rock pockets.

- N. The unconfined vertical drop of concrete shall not be greater than 5 feet. Do not allow concrete to fall free from any height that will cause materials to segregate. Maximum height of free fall permitted in any case: 5 feet. Utilize trunks or additional chutes where doubt occurs. Conform to requirements of ACI 318 Section 5.10.
- O. Horizontal Construction Joints: Wash surface of each joint shortly after pouring to expose clean, sound aggregate. Sandblast surface to remove laitance remaining or loose aggregate as approved by the Architect. Conform to ACI 318 Section 5.7.
- P. Screed floors and slabs on grade level, maintaining surface flatness of maximum 1/8 inch in 10 ft. Slope floors for drains.
- Q. Exterior Slab Contraction Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch, place joints at column lines and at 12 ft. o.c. each way, maximum. Remove groover tool marks on exposed concrete surfaces. Contractor's option: Saw cut joints, early-entry dry-cut, per ACI 302.1R.
- R. Isolation Joints: preformed joint filler depth of slab, fill top 1/2 inch with elastomeric sealant per Section 07 92 00. Locations: at columns, footings, and as noted on drawings.
- S. Surface irregularities, ACI 347R Class A, gradual or abrupt irregularities of 1/8 inch for exposed to view concrete. Class B, 1/4 inch for plaster cement finish.

~~3.4 CURING AND PROTECTION~~

- ~~A. In accordance with Section 033900 Concrete Curing.~~

3.5 FIELD QUALITY CONTROL

- A. Provide free access to Work and cooperate with Architect, DSA and Testing Laboratory
- B. Measure floor and slab flatness and levelness according to ASTM E1155 (ASTM E 1155M) within 72 hours of finishing.
 - 1. Proposed mix design of each class of concrete shall conform to Section 1905A, California Building Code and shall be approved by the Architect prior to commencement of work.

3.6 PATCHING

- A. Architect will inspect concrete surfaces and determine imperfections, if any.
- B. Patch imperfections as approved and in accordance with ACI 301.
 - 1. Clean all exposed concrete surfaces and all adjoining work stained by leakage of concrete. Remove all fins, butts and projections by grinding. Patch voids, rock pockets, holes, cracks and similar imperfections by chipping loose concrete and exposing clean, sound aggregate.
 - 2. Fill cone form tie recesses with Portland cement mortar flush to finish surface.

3.7 DEFECTIVE CONCRETE

- A. Defective Concrete: Remove concrete not conforming to required lines, details, dimensions, tolerances or specified requirements.
- B. Repair or replacement of defective concrete will be determined by the Architect.
- C. Do not patch, fill, touch-up, repair or replace exposed concrete except upon express approval of Architect for each individual area.
- D. Repairs of Concrete shall comply with the ACI and written directive from the Architect.

3.8 MOISTURE TEST FOR CONCRETE FLOORS

- A. Test and, if required, remediate all interior concrete slabs-on-grade scheduled to receive new moisture sensitive floor finishes.

END OF SECTION 033000