SECTION 03310

CAST-IN-PLACE SITEWORK CONCRETE

# GENERAL

## DESCRIPTION

### The CONTRACTOR shall provide all cast-in-place sitework concrete including curbs, gutters, swales, catch basins, sidewalks, steps on grade, pavements, fence and guard post embedment, underground duct bank encasement, thrust and anchor blocks for horizontal and vertical pipe bends, support blocks for valves, collars, cradles, manhole bases, splash pads, and other miscellaneous cast-in-place items indicated to be sitework concrete.

## RELATED WORK SPECIFIED ELSEWHERE

### The Work of the following Sections applies to the Work of this Section. Other Sections, not referenced below, shall also apply to the extent required for proper performance of this Work.

#### Section 01000 – General Requirements

#### Section 01300 – Shop Drawings and Submittals

#### Section 01410 – Testing and Inspection

#### Section 02140 – Groundwater Dewatering

#### Section 02160 – Excavation Support Systems

#### Section 02200 – Earthwork

#### Section 02150 – Sheeting, Shoring and Bracing

#### Section 03740 – Concrete Rehabilitation

## REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

### The publications listed below form part of this specification to the extent referenced and are referred to in the text by the basic designation only. Reference shall be made to the latest edition of said standards unless otherwise called for.

#### ASTM A615/A615M – Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

#### ASTM A1064 – Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

#### ASTM C33 – Standard Specification for Concrete Aggregates

#### ASTM C94 – Standard Specification for Ready-Mixed Concrete

#### ASTM C143 – Standard Test Method for Slump of Hydraulic‑Cement Concrete

#### ASTM C150 – Standard Specification for Portland Cement

#### ASTM C494 – Standard Specification for Chemical Admixtures for Concrete

#### ASTM C881 – Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete

#### ASTM C1107 – Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

#### ASTM C1260 – Standard Test Method for Potential Alkali Reactivity of Aggregates

#### ASTM C1293 – Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction

#### ASTM D1556 – Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

#### ASTM D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort

#### ASTM D2419 – Standard Test Method for Sand Equivalent Value of Soils and Fine Aggregate

#### Concrete Reinforcing Steel Institute – Manual of Standard Practice

#### Caltrans Standard Specifications, Section 26

#### Standard Specifications for Public Works Construction (SSPWC), “Greenbook”

## SUBMITTALS

### All submittals shall be submitted in accordance with Section 01300, “Shop Drawings and Submittals”.

### Furnish mill tests for Portland Cement and reinforcing bars, admixture certifications, aggregate gradation and certification, materials and methods for concrete curing.

### Furnish manufacturer's current printed recommendations and product data sheets for pre-molded expansion joint filler, joint sealant, form release agent, curing compound, repair mortar, non-shrink grout, epoxy bonding agent, and epoxy adhesive.

### Submit concrete mix design at least 15 days before placing concrete.

### Where ready-mix concrete is used, furnish the delivery tickets at the time of delivery of each load of concrete.

#### Each ticket shall show the total quantities, by weight, of cement, sand, each class of aggregate, admixtures, the amounts of water in the aggregate added at the batching plant, and the amount of water allowed to be added at the site for the design mix.

## QUALITY ASSURANCE

### The geotechnical engineer or construction manager will test the Portland Cement Concrete.

#### Refer to Section 01410, “Testing and Inspection of Earth and Concrete” for requirements.

### The DISTRICT will test the compaction and relative density of base materials.

#### Refer to Section 02200, “Earthwork” for requirements.

### The cost of retesting work not conforming to the Standard Specifications shall be paid by the Contractor.

### Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.

# PRODUCTS

## MATERIALS

### Portland Cement Concrete:

#### Portland Cement shall comply with the requirements of ASTM C150, Type V and the optional requirements of ASTM C150, Table 2 for maximum equivalent alkalis (Na20 + 0.658K20) of 0.60 percent, unless otherwise shown on the Drawings.

#### All applications shall use a minimum of Class 560-C-3250 concrete, unless otherwise shown on the Drawings or as directed by the DISTRICT.

##### Mix design requirements for 560-C-3250 concrete shall be in conformance with SSPWC Section 201-1.1.2.

##### The maximum slump shall be 4" to 5”.

##### The maximum water/cement ratio shall be 0.50 by weight.

#### Aggregate:

##### Aggregate shall comply with:

###### SSPWC Section 200-1.4 “Coarse Aggregate Portland Cement Concrete”.

###### SSPWC Section 200-1.5.3 “Sand for Portland Cement Concrete”.

##### Or aggregate shall comply with:

###### SSPWC Section 201-1.3.2 “Combined Aggregate Gradings”.

##### Aggregate shall be tested according to ASTM C33.

##### Aggregate shall be nonreactive and conform to the requirements of ASTM C1260 or ASTM C1293.

#### Water

##### Water shall be potable and free of any deleterious substances.

##### Water shall meet the chloride requirements of SSPWC Section 201-1.2.3.

#### In certain circumstances, water-reducing admixtures may be required.

##### Water-reducing admixtures may be used in the concrete mix when permitted by the DISTRICT.

##### Water-reducing admixtures shall conform to ASTM C494.

#### In certain circumstances, rapid-setting concrete may be required.

##### Accelerating admixtures may be used in the concrete mix when permitted by the DISTRICT.

##### Accelerating admixtures shall conform to ASTM C494.

##### Calcium chloride shall not be used in concrete.

#### Cement used in concrete for any individual structure shall be of the same manufacturer and type, unless otherwise approved by the DISTRICT.

#### Hand mixed concrete:

##### The materials and proportions shall be submitted and approved by the DISTRICT prior to use on-site.

###### The maximum slump shall be 4” to 5” unless otherwise approved by the DISTRICT.

### Reinforcement:

#### Reinforcing bars shall be new, deformed steel conforming to ASTM A615, Grade 60.

##### Refer to Concrete Reinforcing Steel Institute – Manual of Standard Practice.

#### Welded wire reinforcement shall conform to ASTM A1064.

#### Refer to SSPWC Section 201-2.2 for additional requirements.

### Joint material:

#### Pre-molded expansion joint filler.

##### 1/2 inch thick.

##### Depth as required by slab thickness.

##### Refer to SSPWC Section 201-3.2 for additional pre-molded joint filler requirements.

#### Joint sealant:

##### Joint sealant shall be 2-part Polyurethane Sealant, Type A, in accordance with SSPWC Section 201-3.4.

### Form release agent:

#### Colorless form coating compounds that will not bond with, stain, or adversely affect concrete surfaces.

### Concrete curing:

#### Refer to SSPWC Section 201-4, “Concrete Curing Materials” for requirements.

### Mortar:

#### Cement mortar shall consist of a mixture of Portland Cement, sand and water.

#### One-part cement and two parts sand shall first be combined, and then thoroughly mixed with the required amount of water.

#### No admixtures shall be used in mortar unless approved by the DISTRICT.

### Repair mortar:

#### Repair mortar shall be a two-component, cement-based product specifically designed for structurally repairing damaged concrete surfaces.

##### The repair mortar shall exhibit the properties of high compressive and bond strengths and low shrinkage.

##### A medium-slump repair mortar shall be used on horizontal surfaces.

##### A non-sag, low-slump repair mortar shall be used on vertical or overhead surfaces.

#### Repair mortar shall be SikaTop-122 Plus or SikaTop-123 Plus by Sika Corporation or approved equal.

#### Refer to Section 03740 “Concrete Rehabilitation” for additional requirements.

### Non-shrink grout:

#### Non-shrink grout shall be a non-metallic cement-based product intended for filling general construction voids or grouting of base plates for equipment or structural members.

##### The non-shrink grout shall exhibit the properties of high compressive and bond strengths.

##### The non-shrink grout shall have zero shrinkage and shall be capable of mixing to a variable viscosity ranging from a dry pack to a fluid consistency as required for the application.

#### Non-shrink grout shall conform to ASTM C1107.

#### Non-shrink grout shall be Sikagrout 212 or SikaGrout-328 by Sika Corporation or approved equal.

### Epoxy bonding agent:

#### The epoxy bonding agent shall be an epoxy-resin-based product intended for bonding new mortar to hardened concrete.

#### The epoxy bonding agent shall conform to ASTM C881.

#### The epoxy bonding agent shall be Sikadur 32 Hi-Mod by Sika Corporation, or approved equal.

### Epoxy adhesive:

#### Epoxy adhesive shall be a high-modulus epoxy-resin-based product intended for structural grouting of anchor bolts and dowels to concrete.

##### A pourable, medium-viscosity epoxy shall be used on horizontal surfaces.

##### A heavy-bodied, non-sag epoxy gel shall be used on vertical surfaces.

#### The epoxy adhesives shall conform to ASTM C881.

#### Epoxy adhesive shall be Sikadur 31 or Sika Sikadur 35 by Sika Corporation, or approval equal.

### Subgrade material:

#### Subgrade material may be on-site inorganic soil.

##### The material shall have a sand equivalent value of not less than 20 per ASTM D2419.

##### Soils classified as silts and clays shall be removed from the subgrade.

##### Imported subgrade material may be clean, normal sand gravel aggregates having a sand equivalent value of not less than 20 per ASTM D2419.

#### Where an aggregate base is shown on the Drawings or required in these Technical Specifications.

##### The aggregate base shall be Class II Base Rock per Caltrans Standard Specifications Section 26.

##### Maximum aggregate size shall be ¾ inch.

## OTHER MATERIALS

### Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the DISTRICT.

# EXECUTION

## GENERAL:

### Coordinate as required with other work to assure proper and adequate provisions in the other work for interface with the work of this Section.

### Install the work of this Section in strict accordance with the Drawings, pertinent requirements of agencies having jurisdiction, and the manufacturer's recommended installation procedures.

## DELIVERY, STORAGE, AND HANDLING

### Deliver reinforcing steel to the site bundled and tagged with identification. Store on skids to keep bars clean and free of mud and debris. If contaminated, all bars shall be cleaned by wire brushing, sand blasting, or other means prior to being set in forms.

## SURFACE PREPARATION

### Prior to construction of concrete work on subgrade soils:

#### The soil should be scarified to a minimum depth of 6 inches.

#### Moisture conditioned as necessary.

#### Re-compacted in-place to 90% relative compaction unless otherwise shown on the Drawings or in the Technical Specifications.

#### Where pavement is to be placed directly on the subgrade soils, re-compact in-place to 95% relative compaction.

#### Refer to SSPWC Section 301-1 for additional requirements.

#### Refer to Section 02200, “Earthwork” for additional requirements.

## DEWATERING

### Concrete shall be placed "in the dry", unless otherwise approved in writing by the DISTRICT.

#### Furnish temporary drainage facilities to convey and dispose of surface water falling on or passing over the site.

#### The Contractor, at no direct cost to the DISTRICT, shall perform all dewatering activities.

#### Refer to Section 02140, “Groundwater Dewatering” for dewatering requirements.

## ROCK EXCAVATION

### The Contractor’s bid is based on excavation in soils and rippable materials. If rock excavation is encountered, the Contractor and the DISTRICT shall negotiate methods and costs for the rock excavation.

## FORMWORK

### Refer to SSPWC Section 303-1.3, SSPWC Section 303-1.4, and SSPWC Section 303-5.2 for requirements.

## REINFORCEMENT

### Refer to the Concrete Reinforcing Steel Institute – Manual of Standard Practice.

### Refer to SSPWC Section 303-1.7 for requirements.

### All Portland Cement Concrete pavement shall be reinforced with steel reinforcing bars or wire mesh as shown on the Drawings.

## EMBEDDED ITEMS

### All embedded items, including bolts, dowels, anchors, and sleeves, shall be held correctly in place in the forms before concrete is placed.

#### Embedded items shall be positioned and supported so that there will be a minimum of 2 inches clearance between the items and reinforcing steel.

## MIXING AND PLACING CONCRETE

### Refer to SSPWC Section 302-6.3, SSPWC Section 303-1.8, and SSPWC Section 303-5.3 for mixing and placing concrete requirements.

### Refer to SSPWC Section 302-6.5, SSPWC Section 303-1.8.6, and SSPWC Section 303-5.4 for joints in concrete requirements.

### Ready-mix concrete:

#### At the Contractor’s option, ready-mix concrete may be used to meet the requirements of this specification.

##### The materials shall be proportioned by mass at the concrete batch plant, mixed and transported to the job site in accordance with ASTM C94.

##### The truck mixers shall be equipped with electrically-actuated counters by which the number of revolutions of the drum or blades maybe verified.

##### The use of non-agitating equipment for transporting ready-mixed concrete will not be permitted.

##### Refer to SSPWC Section 201-1.4.3 “Transit Mixers” for additional requirements.

##### Ready-mix concrete for any single structure shall be furnished by a single supplier unless otherwise approved by the DISTRICT.

##### Each batch of ready-mixed concrete delivered at the job site shall be accompanied by a delivery ticket furnished to the DISTRICT in accordance with Paragraph 1.04.E.

### Hand Mixed Concrete:

#### Hand-mixed concrete is permitted when the volume of concrete required is less than 1.0 cubic yards.

#### Refer to SSPWC Section 201-1.4.4 for hand mixing requirements.

### Air-placed Concrete

#### Refer to SSPWC Section 303-2 for air-placed concrete construction (Gunite and Shotcrete) and the applicable provisions of SSPWC Section 303-1 for requirements.

#### Only personnel skilled in the techniques of air placement of concrete shall be utilized for air-placed concrete construction.

## CONCRETE FINISHING

### Refer to SSPWC Section 302-6.4, SSPWC Section 303-1.9, and SSPWC Section 303-5.5 for finishing requirements.

## CONCRETE JOINTS

### Refer to SSPWC Section 302-6.5, SSPWC Section 303-1.8.6, and SSPWC Section 303-5.4 for joint requirements.

## CONCRETE CURING

### Refer to SSPWC Section 302-6.6, SSPWC Section 303-1.10, and SSPWC Section 303-5.6 for curing requirements.

## PROTECTION

### Protect all concrete against injury or damage until final acceptance by the DISTRICT.

### Fresh concrete shall be protected from damage due to rain, hail, sleet, or snow. Provide such protection while the concrete is still plastic and whenever such precipitation is imminent or occurring.

## REMOVAL, REPAIRS AND REPLACEMENT OF CONCRETE

### Concrete surfaces or installations that are removed, damaged or broken by the Contractor shall be replaced or reconstructed by the Contractor and approved by the DISTRICT.

#### The concrete surfaces include but are not limited to slabs, equipment pads, pole footings, curbs, gutters, driveways, sidewalks and pavements.

##### In areas where a trench crosses curb and gutter, the curb and gutter shall be cut to the minimum width which will permit proper trench excavation.

##### Sidewalks shall be cut and removed along regular joint lines.

##### Sawcut concrete faces to remain exposed shall be finished smooth to match existing construction with use of approved repair mortar, where required.

##### Sawcuts that expose reinforcement to remain in place shall be repaired with use of approved repair mortar.

#### Refer to Section 03740, “Concrete Rehabilitation” for additional requirements.

END OF SECTION