

## SECTION 7 CONCRETE

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### 7-01 GENERAL

Portland cement concrete improvements shall be constructed as shown on the Standard Plans at the locations and to the dimensions shown on the Plans and specified herein.

### 7-02 MATERIALS

#### 7-02.01 Concrete

Concrete shall conform to Section 90, "Portland Cement Concrete," of the Caltrans Specifications except as modified herein.

The classes of concrete and the combined aggregate grading shall be dependent upon the purpose for which the concrete is intended and shall conform to the table below:

Types of Concrete Work	Concrete Class	Combined Aggregate Grading	Min. Cement (Sks/cy)	Max. w/c Ratio (Gal/Sack)	Max. Slump (Inches)	Min. Str. Test Cyl. 28 Days (PSI)
Curb, Gutter, Sidewalk, Driveway, Island Cap, Barricade Base, Monument, Street Sign Footing, Grill & Picnic Table Base, Bollards	B	3/4" Max.	5	7.0	3	2,500
Valley Gutters, Light Pole Base and any unspecified concrete	A	3/4" Max.	6	6.0	3	3,300

#### 7-02.02 Adhesives

Adhesives shall conform to Section 95, "Epoxy," of the Caltrans Specifications.

#### 7-02.03 Lampblack

At the discretion of the Engineer, lampblack shall be of approved quality mixed at the rate of one-half (1/2) pound (1 pint) per cubic yard of concrete. In the case of island curb, gutter and cap, the lampblack shall be omitted.

#### **7-02.04 Subgrade**

Subgrade shall be 4 inches minimum thickness and comprised of non-expansive material. The thickness shall be increased as determined by the Engineer or geotechnical report.

#### **7-02.05 Joint Filler**

Premolded joint fillers shall conform to specifications of ASTM Designation D1751, and shall be at least three-eighths of an inch (3/8") wide.

#### **7-02.06 Dowels**

Steel dowels shall conform to ASTM Designation A615.

#### **7-02.07 Bar Reinforcement**

Bar reinforcement shall 60 ksi and conform to Section 52, "Reinforcement," of the Caltrans Specifications.

#### **7-02.08 Curing Compound**

Curing compound shall conform to the specifications of AASHTO Designation M148, Type II, clear, and shall consist of a practically colorless impervious liquid which will thoroughly seal the surface of the concrete and will not impart a slippery surface thereto. The quality and the quantity to be used shall be approved by the Engineer. The use of any membraned material which would impart a slippery surface to the concrete or alter its natural color will not be permitted. The colorless, impervious liquid shall contain not less than twenty-five percent (25%) solids.

### **7-03 CONSTRUCTION**

#### **7-03.01 Subgrade Preparation**

The subgrade shall be constructed true to grade and cross-sectioned, as shown on the Plans. The required thickness of aggregate subbase shall be placed in accordance with the Standard Plans, and compacted to ninety-five percent (95%) relative compaction under the curb, gutter, driveway and sidewalk areas as tested in conformance with Test Method No. California 216.

#### **7-03.02 Existing Construction**

Where the Plans provide for the reconstruction of a portion of an existing curb, gutter, sidewalk or driveway, the existing section shall be cut to a minimum depth of one and one-half inches (1-1/2") with an abrasive-type saw at the first scoring line at or beyond the planned joint and the entire section to be reconstructed shall be removed. The new work shall adjoin the old work at this line except when the new concrete work butts up against existing AC pavement. If this is the case a one foot (1') wide AC strip will be

removed. This will allow for the placement of the forms. If the old work is damaged beyond this line in removing the old concrete, a new line shall be cut at the next score line beyond the line of damage and the damaged concrete shall be removed and replaced at no additional cost. Where new concrete work conforms to existing concrete work, steel dowels consisting of No. 4 reinforcement bars shall be placed in existing curb, sidewalk and driveway sections in accordance with Paragraph 7-03.09, "Sidewalks, Driveways, Island Caps and Valley Gutters" of these Standard Specifications.

### **7-03.03 Forms**

Forms shall be true and shall have a smooth, straight upper edge. Metal forms may be used upon approval by the Engineer.

Timber forms shall be surfaced on the side placed next to the concrete and shall not be less than one and one-half inches (1-1/2") thick after being surfaced except on curb returns, horizontal curves and vertical curves where laminated timber forms, benders or thin plank forms may be used.

The form boards of the exposed face of curb shall be milled to the proper radius at the lower inside corner.

Front face forms shall not be removed in less than two (2) hours after the concrete has been placed. In no event shall forms be removed while the concrete is sufficiently plastic to slump. Side forms for sidewalks, island caps, valley gutters and driveways shall not be removed in less than thirty-six (36) hours after the concrete has been placed.

### **7-03.04 Placing Concrete**

No concrete shall be placed until the forms have been inspected by the Engineer and unless the Engineer is present. No concrete shall be placed when the air temperature is below forty degrees Fahrenheit (40°F) or during rain. During weather when frosts may be expected, the Contractor shall carefully cover recently deposited concrete with burlap, straw or provide for other approved curing method. No concrete shall be placed within three (3) hours of sunset. Before placing concrete, the aggregate base or subbase shall be properly moistened with water, and the form faces shall be oiled. A 3 inch high "S" shall be stamped in the top side of concrete curb over sewer laterals (see standard plans.)

Concrete shall be placed and compacted in forms without segregation. After placing, the concrete shall be consolidated sufficiently to produce a dense mass, struck off and floated. Final finishing operations shall not proceed until all bleed water has evaporated from the surface. Sprinkling of dry cement to absorb excessive surface moisture shall not be allowed.

The area around utility poles, electroliers, wooden street sign posts, drop inlets and hydrants shall be blocked out during the initial placing of concrete.

### **7-03.05 Expansion Joints, Control Joints and Score Marks**

Expansion joints shall be placed in the concrete curbs, gutters, sidewalks at not more than twenty-five foot (25') intervals or more than 100 square feet, whichever is smaller, and at each side of the driveways and in all returns. Expansion joints shall be placed at right angles to the curb or sidewalk line and extend through the entire thickness of the concrete. Where sidewalk is constructed against concrete curbs, the joints shall be in line with the joints through the curb. Concrete adjacent to expansion joints shall be finished with an edger tool.

Half inch (1/2") preformed expansion joints shall be placed around utility poles, drop inlets and hydrants so that no concrete is in contact with the appurtenance.

Where existing sidewalks and/or curb and gutter are to be removed and replaced with a driveway, expansion joints will be required at the cold joints.

Where electroliers are located back of sidewalk, expansion joint material shall be placed at the back of walk between the sidewalk and the electrolier base.

Bases for electroliers within the sidewalk shall be completely separated from the sidewalk by felt roofing paper.

Control joints, scored at least one-fifth (1/5) the depth of concrete being placed shall be constructed at intervals not to exceed eight feet (8') in concrete curbs, gutters, sidewalks, centerline of driveways and island caps. The width of the control joints shall not exceed one-fourth inch (1/4") and the edges of control joints shall be finished with a "T" bar. All joints shall be scored at right angles to the curb or sidewalk line.

The sidewalk between control joints shall be divided by transverse score marks placed at nominal thirty-inch (30") intervals and longitudinal score marks placed at uniform intervals not to exceed thirty-six inches (36"), unless otherwise shown on the Plans or directed by the Engineer. All score marks shall be straight, uniformly spaced, one-fourth inch (1/4") in depth and left in a cleanly rounded condition.

Maximum delay between successive pours shall not exceed the time of initial set unless a construction joint is installed.

### **7-03.06 Curing**

As soon as the concrete is set, it shall be cured for a period of at least seventy-two (72) hours by applying a suitable cover that will keep all exposed surfaces continually damp or by spraying with an approved impervious membrane curing compound.

The Contractor shall protect from damage, including graffiti marks, all completed Work. Special emphasis shall be placed on protecting the edge of gutter from being damaged or gouged during grading operations. The Contractor shall keep all equipment off new or existing sidewalks. Repairs shall be made by removing and replacing the entire unit

between score lines or joints. All discolored concrete shall be cleaned to a uniform color. Repairs and cleaning of new concrete shall be at the expense of the Contractor.

### **7-03.07 Curb and Gutter (Also Curb Only)**

Where new curb and new gutter are shown on the Plans adjacent to new sidewalk, the curb, gutter and sidewalk (monolithic pour) shall be constructed together as a unit.

Where new curb and new gutter are shown on the Plans, they shall be constructed together as a unit.

Immediately after removing the front curb forms, the face of the curb shall be troweled smooth and then finished with a steel trowel until a dense, hard, smooth surface has been obtained.

The top surfaces of the curb and gutter shall be finished with a steel trowel to a dense, hard, smooth surface and a straight edge ten feet (10') long is laid on the top or face of the curb or on the surface of gutters; the surface shall not vary more than 0.01 foot from the edge of the straight edge except at grade changes or curves. After the top surface of the curb has been finished to a dense, hard, smooth surface, it shall be given a final brushed finish using a fine, dry brush with brush strokes parallel to the line of the curb.

Where the grade is one-half percent (0.5%), a water flow test will be required to detect depressions in the gutter.

Concrete curbs to be constructed directly over an existing pavement shall be anchored to the pavement by three quarters of an inch (3/4") (minimum) round steel dowels ten inches (10") long on four-foot (4') centers set in cement grout in the existing pavement prior to constructing the curb.

Where new curb and gutter is installed adjacent to existing pavement, the existing pavement within twelve inches (12") of the edge of gutter shall be neatly sawcut, removed and replaced with new pavement. The new pavement shall be installed after the curb and gutter has been constructed and shall be full depth asphalt concrete place in 3" lifts (maximum). Asphalt shall conform to Section 6, "Asphalt Paving and Surfacing," of these specifications.

"G", "S" or "W" shall be stamped in the face of curb where gas laterals, sewer laterals and water services pass under the curb.

### **7-03.08 Extruded Curb**

Extruded curb construction shall conform to Section 73-1.05B, "Extruded or Slip-Formed Curb Construction," of the Caltrans Specifications and Paragraph 7-03.07 above. Extruded curb will only be allowed when specified. The extrusion of monolithic curb, gutter and sidewalk shall not be permitted.

### **7-03.09 Sidewalks, Driveways, Island Caps and Valley Gutters**

Sidewalks, driveways, island caps and valley gutters shall be formed in place. The fresh concrete shall be struck off and compacted until a layer of mortar has been brought to the surface. The surface shall be finished to grade and cross-section with a wood or aluminum float, troweled to a dense, hard, smooth finish with a steel trowel, and finished with a fine, wet and soft brush with brush strokes transverse to the line of traffic.

The finished surface shall not vary more than 0.01 foot from a ten-foot (10') straight edge, except at grade changes, and the finished surface shall be free from blemishes.

When existing sidewalk is to be removed and replaced, the new concrete is to be tied to the remaining concrete curb, sidewalk and driveway sections with dowels. The dowels shall be No. 4's with a minimum length of nine inches (9") and shall be installed at eighteen inches (18") on center along the back of the remaining walk and/or three feet (3') on center on the back of the remaining curb. The dowels are to be inserted to a minimum penetration of four inches (4") into the remaining sidewalk and/or curb and shall fit tightly into the existing concrete.

No. 4 steel reinforcing bars shall be placed as longitudinal reinforcement in all concrete valley gutters. For all sidewalk curb ramps and island passageways ADA requirements and details refer to Caltrans Specifications.

### **7-03.10 Conforms**

Existing concrete driveways or walks shall be cut with a concrete saw to provide a neat line for conforming to new concrete driveway approach or walk. Where necessary, the existing concrete driveway or walk shall be removed to a point sufficiently behind the back of walk line to provide a smooth transition.

All concrete driveway conforms shall be six-inch (6") Portland cement concrete laid on six-inch (6") Class 2 aggregate subbase and concrete walk conforms shall be four-inch (4") Portland cement concrete laid on four-inch (4") Class 2 aggregate subbase conforming to Section 4, "Asphalt Paving and Surfacing," of these Standard Specifications.

Concrete conforms shall match existing concrete as to scoring pattern, color and texture.

### **7-04 Testing**

**7-04.01 Compression Test.** The Portland cement concrete shall be sampled by the Contractor in accordance with ASTM C 172. Cylinders shall be tested for compressive strength by the Contractor in accordance with ASTM C 78. Concrete compressive strength tests representing concrete that has been placed shall attain the 28-day strength as specified. Concrete represented by compressive strength that fails to meet the compressive strength requirements shall be replaced at the Contractor's expense.

**7-04.01 Slump Test.** Slump tests shall be conducted by the Contractor in accordance with ASTM C 173 or C 231 and as directed by the Engineer.