

SECTION 16

CONCRETE CURBS, GUTTERS, VALLEY GUTTERS, SIDEWALKS, DRIVEWAYS, CURB RAMPS AND STREETS

16-1 GENERAL

- A. Unless otherwise specified, streets and valley gutters shall be constructed of Class 2 concrete and concrete curbs, gutters, sidewalks, driveways and curb ramps shall be constructed of Minor Concrete per Caltrans Section 40, "Portland Cement Concrete Pavement"; Section 73, "Concrete Curbs and Sidewalks" and Section 90, "Portland Cement Concrete", of the Caltrans Standard Specifications, except as modified herein. All concrete mixes shall meet Low Carbon Concrete Code Compliance Pathway. Class 2 concrete shall provide a minimum compressive strength of 4500 pounds per square inch at twenty-eight (28) days. Minor Concrete shall provide a minimum compressive strength of 3500 pounds per square inch at twenty-eight (28) days.
- B. For all concrete work in Barron Park, refer to the City of Palo Alto's "Barron Park Drainage and Street Design Guidelines". The document is available upon request from Public Works Engineering at 650-329-2295.

16-2 PRODUCTS

- A. Adhesives
 - 1. Adhesives for bonding new Portland cement concrete to existing Portland cement concrete, attaching metal anchors (dowels) to concrete holes, and any other use as directed by the Engineer shall conform to Section 95, "Epoxy", of the Caltrans Standard Specifications.
- B. Lampblack
 - 1. Lampblack shall be of an approved quality mixed at the rate of two (2) pints of liquid per cubic yard of concrete for sidewalks, curbs, gutters, streets and driveway aprons. Lampblack shall be omitted from island and median concrete.
 - 2. Valley Gutter concrete work in Barron Park shall receive eight (8) pints of liquid lamp black per cubic yard.

C. Dowels

1. Dowels shall be either A36 steel, grade 60, #4 rebar or smooth coated dowels epoxied in place with slip covers twelve (12) inches long

D. Cement

1. Cement shall be ASTM C150 Type I or II in accordance with Section 90 "Portland Cement Concrete," of the Caltrans Standard Specifications. Mix designs shall meet Low Carbon Concrete Code Compliance Pathway cement limits requirements below:

| | Cement limits | Embodied Carbon limits |
|---|--|---|
| Minimum specified compressive strength f'_c , psi (1) | Maximum ordinary Portland cement content lbs/yd ³ (2) | Maximum embodied carbon kg CO ₂ e/m ³ |
| up to 2500 | 362 | 260 |
| 3000 | 410 | 289 |
| 4000 | 456 | 313 |
| 5000 | 503 | 338 |
| 6000 | 531 | 356 |
| 7000 | 594 | 394 |
| 7001 and higher | 657 | 433 |
| Up to 3000 light weight | 512 | 578 |
| 4000 light weight | 571 | 626 |
| 5000 light weight | 629 | 675 |
| Notes: | | |
| (1) For concrete strengths between the stated values, use linear interpolation to determine cement and/or embodied carbon limits. | | |
| (2) Portland cement of any type per ASTM C150. | | |

E. Water

1. Water shall be clean, free from injurious amounts of oil, alkali, organic matter or other deleterious material and shall be in accordance with Section 90 "Portland Cement Concrete," of the Caltrans Standard Specifications.

F. Aggregates

1. Aggregates shall be free from deleterious coatings, clay balls, roots, bark, sticks, and other extraneous material and shall be in accordance with Section 90 "Portland Cement Concrete," of the Caltrans Standard Specifications.

2. Gradation shall be Combined Aggregate Grading in accordance with Section 90 "Portland Cement Concrete," of the Caltrans Standard Specifications.
3. Class 2 Aggregate Bases and Sub-bases shall be in accordance with Caltrans Standard Specifications Section 25 and 26.

G. Admixtures

1. Admixtures shall be approved by the Engineer. Contractor needs to submit the mix design for review and approval.
2. Admixtures shall be in accordance with Section 90 "Portland Cement Concrete," of the Caltrans Standard Specifications.

H. Curing Concrete

1. Curing methods and curing compounds shall be in accordance with Section 90 "Portland Cement Concrete," of the Caltrans Standard Specifications.

I. Metal reinforcement bar #4

1. Unless otherwise specified, reinforcement bar shall be deformed bar A36 steel, grade 60, #4 in accordance with Section 52 "Reinforcement," of the Caltrans Standard Specifications.

J. Steel Bollards

1. Standard Drawing 702 – Installation of Steel Bollard
2. Standard Drawing 703 – Installation of Removable Steel Bollard

K. Detectable Warning Surface

1. The detectable warning surface shall be "Armor-Tile" or an approved equal. Color shall be yellow conforming to Federal Standard 595B, color number 33538 at all yellow crosswalks and shall be dark grey, color number 36118 at all other locations. Where dark grey panels do not provide the required contrast ratio with the existing concrete, yellow panels shall be used. When completing an intersection, the color of the new panels shall match the

existing panels, or as determined by the Engineer or Inspector. Color substitutions during construction may be made at the discretion of the Engineer. (Note: This provision is not intended to mandate the replacement of existing yellow panels.)

2. New curb ramps shall use cast-in-place detectable warning surfaces, existing curb ramp upgrades are to use the bolt down surface mounted detectable warning surfaces installed in accordance to manufacturer's specifications.

16-3 EXECUTION

- A. In all locations of new concrete work including where old concrete is being replaced, the Contractor shall place a minimum of six (6) inches Class 2 aggregate base unless otherwise stated by the Engineer in writing. Less than six (6) inches of existing base material shall not be acceptable. Excavate, re-grade, provide and install additional base as necessary to obtain six (6) inches minimum. Before placing new base or replacing existing material, subgrade material shall be compacted to minimum of 90% relative compaction. The base shall be compacted to a minimum of 95% relative compaction as determined by ASTM Tests D1557, D2922 and D3017.
- B. All gutters, including valley gutters, concrete curb and gutter shall be constructed monolithically. Valley gutter, curb and gutters shall be constructed at least seven (7) days prior to paving operations. The Contractor shall verify grades and locations of the valley gutters, curb and gutter. Any discrepancies in the proposed grades versus the actual conditions shall be reported to the Engineer in writing before the affected work is performed. All gutters shall drain properly at the time of final acceptance of the Work, and it shall be the responsibility of the Contractor to correct any deficiencies.
- C. Where concrete sidewalk is adjacent to the curb and gutter, it shall be poured monolithically with the curb and gutter unless directed otherwise by the Engineer.
- D. The Contractor shall adjust all existing and new gas and water meter, sewer cleanouts and valve boxes, vent castings and other service castings within the limits of the Work to exact grade at the time concrete improvements are being constructed, and shall maintain these appurtenances to a true and exact grade until the concrete is thoroughly set.
- E. The Contractor shall restore any irrigation and special surface treatments encountered in the execution of this work to an equivalent or better condition that existed prior to the commencement of work. The above shall include but not be limited to brickwork, painting of curbs by the designated colors that pre-existed,

address painted on curb (white background with black numbers). All marks/stamps indicating sanitary sewer services "S" removed shall be replaced, other utilities stamps such as gas "G" and water "W" do not need to be replaced. .

- F. Where utility poles, fire hydrants, catch basins or other appurtenant structures lie within the limits of Work, the Contractor shall provide a one-half (1/2) inch preformed expansion joint around such items neatly formed to correspond with the surface of the finished concrete.
- G. Where electroliers are located in back of a sidewalk, expansion joint material shall be placed at the back of the walk between the sidewalk and the electrolier base. Bases for electroliers shall be completely separated from the sidewalk by felt roofing paper.
- H. Unless otherwise specified, rebar #4 shall be installed in all valley gutters, twelve (12) inches on center, both ways. Refer to Standard Specifications Drawings 131, 132, 132A, 132B – Valley Gutter.
- I. No concrete shall be placed until the forms have been checked by the Engineer. No concrete shall be placed when the ambient air temperature is below 40° F or during rain.
- J. 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.
- K. A water flow test will be required to detect depressions in the new gutter during finishing of the concrete.
- L. Curb ramps conforming with the Standard Drawings and Specifications shall be constructed at all new curb returns and other locations specified on the plans or directed by the Engineer.
- M. Curb ramps shall have a detectable warning surface that extends the full width and three (3) feet depth of the curb ramp. The edge of the detectable warning surface nearest the street shall be between six (6) inches and eight (8) inches from the gutter flowline. Curb ramps with raised truncated domes shall follow Caltrans Standard Plans, Curb Ramp Details No. A88A and Specifications. Refer to Standard Specifications Drawings 101 through 105 for details.

- N. For retrofit conditions, not limited to removal and replacement of curb apron shall be approved by the Engineer prior to construction. The detectable warning surface shall be flush with the surrounding surface.
- O. Existing concrete improvements shall be saw-cut to full depth at concrete conforms and from cold joint to cold joint unless specified otherwise by the Engineer. At all locations where new concrete will be installed to abut existing concrete and the plans show that the existing concrete shall be saw-cut to conform to the line of abutment, such cutting shall be done in such a manner that spalling and cracking of the existing concrete which is to remain in place is avoided. All damaged existing concrete which is to remain in place shall be replaced at the Contractor's expense. The saw-cut shall be to the full depth of the existing concrete.
- P. Install dowels between all new and existing concrete. Dowels shall be twelve (12) inches long, installed two (2) feet on center, beginning six (6) inches from each saw cut edge of trench or opening.
- Q. Gutter pans transitioning from three (3) feet wide to two (2) feet wide shall have a transition zone of six (6) feet. Refer to Standard Drawing 142 – Curb Transitions.

END OF SECTION