

CONSTRUCTION STANDARDS

SECTION CS 5

ASPHALT CONCRETE

CS 5-01 GENERAL: Furnishing, spreading and compacting Asphalt Concrete shall be in conformance with Section 39, "Asphalt Concrete" of the CALTRANS Standard Specifications except as amended by Section CS-5, "Asphalt Concrete", of the City Standard Specifications and Standard Drawings.

CS 5-02 ALLOWABLE MATERIALS:

- A. General:** Asphalt Concrete shall be Type A, Modified unless otherwise specified by the Project Plans or Special Provisions.
- B. Aggregate grading:** Aggregate used in Asphalt Concrete shall conform to the grading requirements of Section 39-2.02, "Aggregate," of the Standard Specifications, as modified herein.
 - 1. Aggregate shall be a minimum of 85% machine aggregate with a minimum of two fractured faces.
 - 2. Aggregate shall be $\frac{3}{4}$ inch Maximum, Medium grading for streets with a Traffic Index greater than eight (8).
 - 3. Aggregate shall be $\frac{1}{2}$ inch Maximum, Medium grading for parking lots, bike paths, streets with a Traffic Index equal to or less than eight (8), and for overlays less than $2\frac{1}{4}$ inches in compacted thickness.
 - 4. Aggregate shall be $\frac{3}{8}$ inch Maximum grading for sports courts.
- C. Asphalt Binder:** Asphalt binder shall be Performance Grade 64-10 paving asphalt conforming to Section 92, "Asphalt," of the CALTRANS Standard Specifications unless otherwise specified on the Project Plans or Special Provisions.
- D. Air Voids:** The percentage of air voids in the mix design at the target asphalt binder content ("Target Oil Content") shall be between three (3) and five (5) percent.

CS 5-03 MIX DESIGN:

- A.** The Contractor shall provide the Asphalt Concrete mix design to the Director of Public Works at least ten (10) working days prior to start of work on the project for review and approval. The mix design must be approved prior to commencement of work.

The Asphalt Concrete mix design shall indicate the following:

1. Complete aggregate gradings with the percentage of aggregate passing each sieve size and that the aggregate is in conformance with paragraph CS5-02B.
 2. Percent air voids for each percentage of asphalt binder used in the mix design determination.
 3. Hveem Stability for each percentage of asphalt binder used in the mix design determination.
 4. Compacted unit weight for each percentage of asphalt binder used in the mix design determination per CTM 308 “Method of Test Bulk Specific Gravity and Density of Bituminous Mixtures”.
 5. Laboratory Test Maximum Density at Target asphalt binder used in the mix design determination per CTM 375 “Determining the in Place Density and Relative Compaction of Asphalt Concrete”.
 6. Percent asphalt binder recommended for the Target Oil Content.
- B.** The Target Oil Content to be mixed with the aggregate for Asphalt Concrete shall be approved by the Director of Public Works based on data from California Test Method (CTM) 367, “Method for Determining Optimum Bitumen Content”, provided by the Contractor.

CS 5-04 PROPORTIONING AND MIX TOLERANCE:

- A. Proportioning:** If the Contractor selects the batch mixing method, Asphalt Concrete shall be produced by the automatic batch mixing method as provided in Section 39-3.03A(2), “Automatic Proportioning,” of the Standard Specifications.
- B. Mix Tolerance:** The maximum single point tolerance for binder content during placement of the Asphalt Concrete shall be plus or minus 0.45% from the Target Oil Content designated by the approved mix design unless the tolerance will create a mix that is outside the specifications for air voids and/or stability.

CS 5-05 SPREADING AND COMPACTING:

- A. General:** Spreading and Compacting shall conform to Section 39-6 “Spreading and Compacting of the CALTRANS Standard Specifications except as amended herein. Asphalt Concrete shall be placed only when the atmospheric temperature is above 50 degrees F. Asphalt Concrete shall be spread at a mix temperature of not less than 260 degrees F. When placing Asphalt Concrete, large aggregate that migrates to the surface during any handwork shall be returned to the paver box, rather than scattered over the surface of the mat.

B. Asphalt thickness less than 0.15 foot in thickness or widths less than 5 feet: Asphalt Concrete placed in layers less than 0.15-foot in compacted thickness or widths of less than five (5) feet shall be spread and compacted with the equipment and by the methods specified in Section 39 of the CALTRANS Standard Specifications.

C. Asphalt thickness of 0.15 foot in thickness and widths of 5 feet and greater: Asphalt Concrete placed in layers of 0.15-foot and greater in compacted thickness and widths of five (5) feet and greater shall be spread and compacted with the equipment and by the methods specified in said Section 39, except as amended as follows:

1. The entire contents of Section 39-5.02, "Compacting Equipment," of the CALTRANS Standard Specifications are amended to read:

"39-5.02 Compacting Equipment - The Contractor shall furnish a sufficient number of rollers to obtain the compaction specified and surface finish required by these Specifications. Each roller shall have a separate operator. All rolling equipment shall be self-propelled and reversible. All rollers shall be equipped with pads and water systems, which prevent sticking of asphalt mixtures to the pneumatic or steel-tired wheels. A parting agent, which will not damage the asphalt mixture, as determined by the Inspector, may be used to aid in preventing the sticking of the mixture to the wheels. Other equipment, approved by the Inspector in accordance with CTM 113, "Method for Evaluating the Capabilities of Asphalt Concrete Compactors", may be substituted for 3-wheel or tandem rollers when used as specified in Section 39-6.03, "Compacting."

2. The entire contents of Section 39-6.03, "Compacting," of the CALTRANS Standard Specifications, is amended to read:

"39-6.03 Compacting - A pass shall be one movement of a roller in either direction. A coverage shall be as many passes as are necessary to cover the entire width being paved. Overlap between passes during any coverage, made to ensure compaction without displacement of material in accordance with industry accepted rolling practice, shall be considered to be part of the coverage being made and not part of a subsequent coverage. Each coverage shall be completed before subsequent coverage is started.

Rolling shall commence at the lower edge and shall progress toward the highest portion, except that when compacting layers which exceed 0.25-foot in compacted thickness, and if directed by the Inspector, rolling shall commence at the center and shall progress outwards.

Rolling shall be performed so that cracking, shoving, or displacement is avoided.

Initial breakdown rolling shall commence as soon as practical following the spreading of the Asphalt Concrete.

Finish rolling or final compaction shall be completed while the temperature of the mixture is at or above 150° F. A vibratory roller may be used as the finish roller provided that it meets the requirements for a finish roller and is operated with the vibratory unit turned off.

Asphalt Concrete shall be finished to the lines, grades, and cross section shown on the Project Plans.

Asphalt Concrete shall be compacted to not less than 95.0 percent for a single test and not less than an average in place density of 96.0 percent relative compaction of the Laboratory Test Maximum Density as determined by, CTM 375 except as modified by these specifications.

In-place density of the Asphalt Concrete will be based on test results from a nuclear gauge and core samples taken in accordance with CTM 375, "Determining the in Place Density and Relative Compaction of Asphalt Concrete Pavement" except as modified below. The Inspector will determine when core sample testing shall be completed.

The materials testing laboratory will obtain random samples of the hot mix asphalt (HMA) material from behind the paving machine in accordance with CTM 125, "Methods for Sampling Highway Materials and Products in Roadway Structural Sections", to determine the Laboratory Test Maximum Density of the HMA mixture in accordance with CTM 308.

Asphalt Concrete compaction shall be accepted based upon passing tests taken from the nuclear gauge. In the event that the nuclear gauge testing presents failing results, then core samples will be the determination for the in place density and acceptance or rejection of the compaction.

When core testing is to be performed to determine the relative compaction after nuclear gauge testing has not produced passing tests, the materials testing laboratory will obtain four 4" diameter core specimens (or four 6" diameter core specimens) for determination of relative density of the completed pavement. The four cores shall represent each 500 ton lot in lieu of the sample frequency requirements specified in CTM 375.

Upon completion of the rolling operations, if requested by the Contractor and accepted by the Inspector, the Asphalt Concrete shall be cooled by applying water. Applying water shall conform to the provisions in Section 17, "Watering of the CALTRANS Standard Specifications".

The completed surfacing shall be thoroughly compacted, smooth and free from ruts, humps, depressions or irregularities. Any ridges, indentations or other objectionable marks left in the surface of the Asphalt Concrete by blading or other equipment shall be eliminated by rolling or other means approved by the Inspector. The use of any

equipment that leaves ridges, indentations or other objectionable marks in the Asphalt Concrete shall be discontinued, and acceptable equipment shall be furnished by the Contractor.

When a straightedge 12 feet long is laid on the finished surface and parallel with the center line, the surface shall not vary more than 0.01-foot from the lower edge of the straightedge. The transverse slope of the finished surface shall be uniform to a degree such that no depressions greater than 0.02-foot are present when tested with a straightedge 12 feet long laid in a direction transverse to the center line and extending from edge to edge of a 12-foot traffic lane.

Pavement within 50 feet of an approach slab, or within 50 feet of a structure when no approach slab exists shall conform to the smoothness tolerances specified in Section 51-1.17, "Finishing Bridge Decks", of the CALTRANS Standard Specifications."

CS 5-06 EXISTING PAVEMENT:

- A.** Cut lines made on existing pavement, both longitudinally and transversely, for the placing of new structural section shall be straight and smooth.
- B.** Edge grinding (Cold Planing) shall be required where existing asphalt is to be overlaid. The edge grind shall match the depth of the Asphalt Concrete overlay along the length of the gutter lip and abutting pavement where the Asphalt Concrete pavement is proposed to conform to the existing pavement.
- C.** The surface edges that abut the proposed Asphalt Concrete shall be clean and free of dirt and dust prior to placing a tack coat. Asphalt emulsion shall be used as a tack coat or paint binder on new pavement that is to receive a second lift which is not placed within 24 hours of the first lift, or which has been exposed to traffic or other sources of contaminants, or on existing pavements that are to receive an Asphalt Concrete overlay, and also along exposed edges of abutting pavement and concrete curbs and gutters. A tack coat may also be required between subsequent layers of Asphalt Concrete placed by the contractor when ordered by the Director of Public Works. Asphalt emulsion shall conform to Section 92, "Asphalts", of the CALTRANS Standard Specifications.
- D.** Existing pavements to be overlaid with Asphalt Concrete shall include the installation of pavement reinforcing fabric in accordance with Section CS 7, "Geotextile Fabrics", of the City Standard Specifications.

CS 5-07 MISCELLANEOUS PAVING REQUIREMENTS:

- A.** The Contractor shall schedule paving operations such that at the end of each work shift, each layer of Asphalt Concrete is placed on all contiguous lanes and shoulders of a traveled way to be opened to public traffic.
- B.** At the end of each work shift, the distance between the ends of the layers of Asphalt Concrete on adjacent lanes shall not be greater than 10 feet nor less than five (5) feet. A drop-off of more than 0.15-foot will not be allowed at any time between adjacent lanes open to public traffic.
- C.** Additional Asphalt Concrete shall be placed along the transverse edge at the end of each lane and along the exposed longitudinal edges between adjacent lanes, hand raked, and compacted to form temporary conforms. Kraft paper, or other approved bond breaker, may be placed under the conform tapers to facilitate the removal of the taper when paving operations resume.
- D.** Additional Asphalt Concrete surfacing material shall be placed along the edge of the surfacing at private drives, hand raked, if necessary, and compacted to form smooth tapered conforms.

CS 5-08 GRADING TOLERANCE:

- A.** If the finished surface of the Asphalt Concrete does not meet the required surface tolerances, as specified in Section CS 5-05D, "Compacting", of the City Standard Specifications, the Contractor shall at its own expense, bring the pavement surface within tolerance by one of the following methods: The Inspector shall determine which method the Contractor is required to perform.

1. Method A

- a.** The Contractor shall Cold Plane the asphalt pavement to a minimum depth of 0.15 feet from specified finish surface (lateral limits shall be from edge of Asphalt Concrete to edge of Asphalt Concrete; longitudinal limits shall extend a minimum of 50 feet, starting from the outer edge of the tolerance area and extending outward, and as directed by the Inspector). All grindings shall be removed and disposed of in accordance with Section 7-1.13, "Disposal of Material Outside the Highway Right-of-Way," of the CALTRANS Standard Specifications.
- b.** The Contractor shall apply tack coat and place an overlay of Asphalt Concrete in accordance with the requirements of the City Standard Specifications.
- c.** The area to which paint binder has been applied shall be closed to public traffic. Care shall be taken to avoid tracking binder material onto existing pavement surfaces beyond the limits of construction.

2. Method B

- a.** The Contractor shall groove and grind the Asphalt Concrete pavement in conformance with Section 42, “Groove and Grind Pavement”, of the CALTRANS Standard Specifications.
- b.** The Contractor shall furnish and apply a fog seal on the pavement after the Inspector approves the groove and grind work. The fog seal shall conform to Section 37, “Bituminous Seals” of the CALTRANS Standard Specifications. The Inspector shall approve the grade of asphaltic emulsion to be used in the fog seal and the limits of installation.
- c.** The area to which the fog seal has been applied shall be closed to public traffic. Care shall be taken to avoid tracking the fog seal material onto existing pavement surfaces beyond the limits of construction.