

SECTION 12 ROADWAY MARKINGS

12-01 GENERAL

This work shall consist of furnishing and applying thermoplastic traffic stripes (traffic lines) and pavement markings, including glass beads, and pavement markers. Traffic stripes and pavement markings shall conform to the requirements of Section 84, "Traffic Stripes and Pavement Markings," and Section 85, "Pavement Markers," of the Caltrans Specifications, except as modified herein.

For the purposes of this section traffic stripes (traffic lines) are defined as longitudinal centerlines and lane lines which separate traffic lanes in the same or opposing direction of travel, and longitudinal edge lines which mark the edge of the traveled way or the edge of the lanes at gore areas separating traffic. Pavement markings are defined as transverse markings which include, but are not limited to, word and symbol markings, limit lines (stop lines), crosswalk lines, shoulder or edge markings, and parking stall markings.

12-02 MATERIALS

12-02.01 General

All traffic stripes, pavement markings, and pavement markers (reflectors) shall be consistent with the latest Caltrans Standard Plans. The Contractor shall be responsible for providing all stencils for the work.

Copies of Caltrans Specifications for traffic paint may be obtained from the Transportation Laboratory, P.O. Box 19128, Sacramento, CA 95819, telephone number (916) 227-7000.

Painted traffic stripes and markings shall be Rapid Dry Water Borne paint and conform to the Caltrans Specification 8010-91D-30.

Thinning of paint will not be allowed.

The manufacturer shall provide the Engineer with a Certificate of Compliance. The certificate shall certify that the paint complies with the specifications and that paint manufactured to the same formulation and process has previously passed State testing. A list of manufacturers that have produced paint meeting Caltrans Specifications is available from the Transportation Laboratory. Material supplied by manufacturers other than those that have manufactured approved paint will require complete testing at the expense of the Contractor.

12-02.02 Thermoplastic Stripes and Markings

Stripes and markings shall be hot applied markings conforming to Section 84, "Traffic Stripes and Pavement Markings," of the Caltrans Specifications and shall be Cataphote-Catatherm brand, Pavemark Thermoplastic brand or approved equal. All paint used in thermoplastic shall be certified lead-free paint.

Thermoplastic stripes and markings shall have a minimum skid friction value of BPN = 35. Submit Caltrans inspection tags with each load of material delivered to the job site. Glass beads to be applied to the surface of the molten thermoplastic material shall conform to the requirements of Caltrans Specification 8010-21C-22 (Type II).

12-02.03 Permanent Pavement Markers and Adhesives

Pavement markers shall be Type D 2-way yellow reflective markers and 2-way blue reflective markers and shall be of the prismatic reflector type consisting of methyl methacrylate or suitably compounded acrylonitrile-butadiene-styrene (ABS) shell filled with a mixture of an inert thermosetting compound and filler material. Adhesive for pavement markers shall be either rapid set epoxy or hot melt bituminous adhesive. Submit Caltrans inspection tags with each load of pavement markers delivered to the job site.

12-02.04 Traffic Island Bars

Raised traffic island bars shall conform to the requirements of Section 84, "Traffic Stripes and Pavement Markings," of the Caltrans Specifications.

12-03 CONSTRUCTION METHODS

12-03.01 General

Existing surfacing which is to receive the paint shall be mechanically wire brushed to remove all dirt and contaminants immediately prior to the application. Paint and pavement markers shall be applied only to dry pavement surfaces and only when the pavement surface temperature is above fifty degrees Fahrenheit (50° F). The pavement surface to which the paint is applied shall be completely coated and the voids of the pavement surface shall be filled. Pavement markers shall not be placed on slurry seal coat until the surfacing or seal coat has been opened to public traffic for a period of not less than 7 days when hot melt bituminous adhesive is used, and not less than 14 days when epoxy adhesive is used.

Water borne paint shall not be heated to a temperature greater than one hundred fifty degrees Fahrenheit (150°F).

Pavement markings shall be applied in two coats. The first coat of paint shall be dry to the Engineer's satisfaction before application of the second coat.

Each coat of paint shall be applied approximately at a rate of 215 square feet per gallon.

The volume of paint applied shall be measured by stabbing the paint tank with a calibrated rod. At the option of the Engineer, if the striping machine is provided with paint gauges, the volume of paint may be determined by using the gauges.

12-03.02 Codes and Standards

The standards, recommended methods and tests contained in the publications cited below shall determine the standards for the work to be done hereunder unless otherwise specifically designated on the plans:

- A. The State of California Maintenance Manual, latest edition.
- B. The State of California Traffic Manual, latest edition.
- C. The regulations, standards, and tests of the State of California Department of Transportation Materials and Research Division.
- D. The State of California (Caltrans) Standard Plans and Specifications.

Reference by manufacturers, brands or models is to establish type and quality of materials desired. Substitutions of materials of equal quality will be permitted upon the prior written approval of the Engineer.

12-03.03 Equipment

Mechanical mixers shall be used to mix paint. Prior to applying, the paint shall be mixed a sufficient length of time to thoroughly mix the pigment and vehicle together, and shall be kept thoroughly agitated during its application.

Mechanical means shall be used to paint pavement markings.

All equipment used in the application of pavement markings shall produce pavement markings of uniform quality that conform to the specified requirements.

All spray equipment shall be of a proper type and of adequate capacity for the work. Air atomized spray equipment shall be equipped with oil and water extractors and pressure regulators and shall have adequate air volume and compressor recovery capacity. Spray gun tip needle assemblies and orifices shall be of the proper sizes.

12-03.04 Timing of Application

If permanent pavement markers cannot be installed immediately, short term, temporary pavement markers shall be installed on new roadways before the street will be opened for traffic.

12-03.05 Control of Alignment and Layout

All work necessary to establish satisfactory alignment for stripes and all layout work required for pavement stripes and markings and pavement markers shall be performed by the Contractor with any device or method that will not damage the pavement or conflict with other traffic control devices.

12-03.06 Control Points & Premarking

The Contractor shall, prior to placing new slurry seal, tie out all existing striping and pavement markings, unless locations are otherwise modified in these specifications. Premarking (cat-tracking) shall be required for painting all items on newly placed slurry seal surfaces. Tape or temporary paint striping shall be installed for all crosswalks and stop bars. The cat-tracking and temporary paint shall be white or the color of the final striping and shall be maintained until placement of the final striping. The Contractor shall notify the Engineer twenty-four (24) hours in advance for inspection and approval of the premarking.

The Contractor concurrently with the final striping and pavement marking application shall remove all temporary tape, paint striping, and tabs placed prior to slurry seal.

12-03.07 Tolerances and Appearance

Completed traffic stripes shall have clean and well-defined edges without running or deformation, shall be uniform, shall be straight on tangent alignment, and shall be on a true arc on curved alignment. The widths of completed traffic stripes shall not deviate more than $\frac{1}{4}$ -inch on tangent or more than $\frac{1}{2}$ -inch on curves from the widths specified in these Standard Specifications or shown on the plans. Broken traffic stripes shall also conform to the following requirements:

- A. The lengths of the gaps and individual stripes that form broken traffic stripes shall not deviate more than 2 inches from the lengths specified in these Standard Specifications.
- B. The lengths of the gaps and individual stripes shall be of such uniformity throughout the entire length of each broken traffic stripe that a normal striping machine will be able to repeat the pattern and superimpose additional stripes upon the traffic stripe being applied.

The completed pavement markings shall have clean and well-defined edges without running or deformation and shall conform to the dimensions specified in these Standard Specifications or shown on the plans, except that the Engineer may accept minor variations.

Drips, overspray, improper markings, and paint and thermoplastic material tracked by traffic shall be immediately removed from the pavement surface by methods approved by the Engineer. All such removal work shall be at the Contractor's expense.

12-03.08 Protection from Damage

The Contractor shall provide suitable barriers, warning signs, traffic control, and other arrangements to keep both pedestrian and vehicular traffic away from the freshly applied surfaces until the thermoplastic material has sufficiently hardened. Damage to the newly applied traffic stripes or pavement marking or pavement markers because the Contractor fails to protect the work shall be removed and re-applied by, and at the expense of, the Contractor. Any overspray or tracking

of paint shall be removed to the satisfaction of the Engineer. No additional compensation will be made for this work.

12-03.09 Thermoplastic Stripes and Markings

Thermoplastic stripes and markings shall be applied hot in conformance with the manufacturer's recommended instructions and the applicable requirements of Section 84-2.04, "Application," of the Caltrans Specifications. Glass beads shall be applied immediately to the surface of the molten thermoplastic material, at a rate of not less than 8 pounds per 100 square feet. The amount of glass beads applied shall be measured by stabbing the glass bead tank with a calibrated rod.

12-03.10 Pavement Markers

Pavement markers shall be installed in conformance with the requirements of Section 85-1.06, "Placement," of the Caltrans Specifications. Markers shall be installed accurately to the line established by the Engineer. No markers shall be installed until the Engineer has approved the surface.

12-03.11 Reflectorized Pavement Markers

Reflectorized markers shall be installed accurately at the locations specified and in the positions specified on the detail drawings or called for in the State of California Maintenance Manual.

The portion of the roadway surface to which the marker is to be bonded shall be free of dirt, curing compound, grease, oil, moisture, loose or unsound layers, paint, and any other material that would adversely affect the bond of the adhesive. Cleaning shall be done by blast cleaning on all surfaces regardless of age or type, except that blast cleaning of clean, new asphalt concrete and clean, new seal coat surfaces will not be required when hot melt bituminous adhesive is used. Adhesive shall be placed uniformly on the pavement surface or on the bottom of the marker in a quantity sufficient to result in complete coverage of the area of contact of the marker with no voids present and with slight excess after the marker has been pressed in place. The marker shall be placed in position and pressure applied until firm contact is made with the pavement. When hot melt bituminous adhesive is used, the markers shall be placed immediately after application of the adhesive. Excess adhesive around the edge of the marker, excess adhesive on the pavement, and adhesive on the exposed surfaces of the markers shall be immediately removed. Soft rags moistened with mineral spirits conforming to Federal Specification TT-T-291 or kerosene may be used, if necessary, to remove adhesive from exposed faces of pavement markers. No other solvent shall be used. The marker shall be protected against impact until the adhesive has hardened to the degree designated by the Engineer.

The Engineer shall be the judge as to when adhesive has set sufficiently to bear traffic.

Blue reflective markers shall be placed adjacent to fire hydrant on all the streets that are being slurry sealed.