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### Section 81 Miscellaneous Traffic Control Devices

#### 4-8101 General

This section describes the work for installing and placing miscellaneous traffic control devices, which include delineators and pavement markers.

Delineators are reflective devices installed in a series at the side of the roadway to indicate the roadway alignment. A delineator consists of a post and two target plates.

Pavement markers may be retroreflective, nonreflective, and retroreflective-recessed. When allowed, pavement markers may be placed using a moving lane closure to control traffic.

#### 4-8102 Before Work Begins

Before work begins, take the following steps:

- Refer to the “Pavement Markers and Traffic Lines, Typical Details” sheets of the *Standard Plans* for details about placing pavement markers.
- Refer to Section 95, “Epoxy,” of the *Standard Specifications* for epoxy adhesive specifications.
- Review the contractor’s proposed method of controlling traffic and verify that all the specified components of any required traffic control system are in place.
- Order and obtain the Caltrans-furnished material identified in the specifications.
- Verify that delineators, pavement markers, and adhesive material are listed on Form CEM-3101, “Notice of Materials to Be Used.”
- Refer to Section 6-202, “Responsibilities for Acceptance of Manufactured or Fabricated Materials and Products,” of this manual for additional information.

#### 4-8102A Delineators

Review the delineator list shown on the plans, and inform the contractor of any changes, preferably before material is ordered. Part 3, “Markings,” of the *California Manual of Uniform Traffic Control Devices (California MUTCD)*, provides design details for delineators.

#### 4-8102B Pavement Markers

- Take samples, when necessary, in accordance with the sampling frequency tables in Chapter 6, “Sampling and Testing,” of this manual.
- When the contractor is to use bituminous material, check the maximum safe heating temperature recommended by the manufacturer.

- Inspect the contractor's equipment and determine the method to be used for checking the bituminous adhesive temperature.
- Determine the proposed method of removing and disposing of residue from pavement recesses.
- Do not permit pavement removal to begin until the contractor has submitted the required documents.

#### **4-8103      During the Course of Work**

During the work, take the steps listed within each of the three areas below.

##### 4-8103A Delineators

- Verify that the contractor provides and installs delineators at locations shown on the plans or where directed by you.
- Inspect the materials and method of installation according to the specifications.
- Document and approve minor deviations from the plans.
- Before the material is incorporated, inspect material either by collecting the inspection tags or matching the material against information in the certificate of compliance.
- Check that the contractor follows the method of placement specified.
- During the installation of target plates, check that the contractor has used washers and installed nuts and rivets properly.
- After installation, check for any damage to the installed material; document any rejections.
- Check posts for damage during the driving process. If ground conditions are such that the post cannot be driven without being damaged, verify that the contractor drills pilot holes.
- After the post is set, verify that any space around it is filled with rock-free earth and that it holds the post securely in position.
- Before contract acceptance, verify that any exposed areas where the paint is damaged are spot-painted and that any exposed areas that are soiled are cleaned.

##### 4-8103B Pavement Markers

- Verify that the contractor furnishes and places pavement markers at locations shown on the plans or where directed by you.
- Before placement of pavement markers, make sure that pavement has cured for the specified time.
- Before the contractor applies adhesives, check that the pavement is clean and the surface is dry.
- Check pavement and air temperatures.

- Verify that markers are placed using the correct adhesive.
- Only allow the use of a flexible bituminous adhesive for placement of pavement markers in pavement recesses.
- Do not allow the use of epoxy adhesive for placement of plastic nonreflective pavement markers.
- Determine that the contractor meets the time requirements between mixing adhesive and placing pavement markers.
- Check the contractor's layout work to assure correct alignment and spacing.
- Determine that the patterns and types of pavement markers are placed correctly in accordance with the typical details on the plans. Verify that retroreflective pavement markers are placed such that each retroreflective face is perpendicular to a line parallel to the roadway centerline.
- After placement, determine that the pavement markers are not on longitudinal or transverse joints and that they are fully supported with adhesive.
- After placement, look for any missing or damaged pavement markers and document any rejections. Conduct and document an immediate night inspection to verify the reflectivity of the installed material. If you encounter any problems, notify the contractor immediately for corrections.
- Determine when the adhesive has set long enough for newly installed pavement markers to bear traffic.

#### *4-8103B (1) Hot Melt Bituminous Adhesive*

- If using hot melt bituminous adhesive for placement of pavement markers on asphalt concrete or a new seal coat, verify that the surface or seal coat has been open to traffic for at least 7 days.
- Verify that the application temperature of bituminous adhesive is within the specified range.
- Make sure that the contractor removes any adhesive from the marker's exposed lenses using a soft rag moistened with the manufacturer's instructed solvent.

#### *4-8103B (2) Epoxy Adhesive*

- If epoxy adhesive is used for placement of pavement markers on asphalt concrete or a new seal coat, verify that the surface or seal coat has been open to public traffic for at least 14 days and the pavement and ambient air temperatures comply with the epoxy adhesive manufacturer's instructions.
- Make sure that the contractor uses automatic mixing equipment for the application of epoxy adhesive.
- When the contractor uses epoxy adhesive, which comes in two separate components, check the mixing for specification compliance. Verify that the proportions of the two components match the specifications. During the placing of pavement markers, observe the epoxy adhesive to verify that it is uniformly

gray without black or white streaks. Even minor variations in the correct proportions of the two components will weaken the adhesive quality of epoxy.

#### **4-8103B (3) Pavement Recesses**

- Do not allow construction of recesses on existing structures.
- Make sure the contractor removes residue with a vacuum before it is blown by traffic or wind.

#### **4-8103C Existing Pavement Markers and Delineators**

- Check that work performed on existing pavement markers and delineators complies with Section 81-8, "Existing Pavement Markers and Delineators" of the *Standard Specifications*.
- Observe the removal procedure for pavement markers. As early as possible, advise the contractor of the required type of repair to damaged pavement or surfacing.
- Note the provisions for protecting public traffic from fragments. Require the contractor to remove all removed markers and fragments from the right-of-way as specified.

#### **4-8104 Level of Inspection**

Suggested levels of inspection for typical stabilization work activities are:

- Intermittent inspection of epoxy adhesive mixing. At the start of each work shift, verify that the contractor checks the mixed epoxy adhesive ratio of the two components in your presence.
- Intermittent inspection of placing delineators and pavement markers.

#### **4-8105 Quality Control**

Verify that delineators and pavement markers listed in Form CEM-3101, "Notice of Materials to Be Used," are on the Authorized Materials List for signing and delineation at:

<https://dot.ca.gov/programs/engineering-services>

Collect the certificates of compliance for the materials and verify that materials are from the manufacturer listed in the approved Form CEM-3101.

#### **4-8106 Payment**

##### **4-8106A Delineators**

Count delineators and record the counts to support partial and final payments.

#### 4-8106B Pavement Markers

Measure the pavement markers according to the units specified. Record the measurement in the daily reports and the calculation sheets to support partial and final payments.

When large quantities of pavement markers will be placed, you may count the markers by keeping track of the number of marker boxes used. Check this number against the theoretical number of markers to be placed.

#### 4-8106C Existing Facilities

Familiarize yourself with the measurement and payment clauses for existing facilities to be removed. Determine whether the necessary measurements must be taken before or during removal.