

**SECTION 20**  
**TRAFFIC STRIPING, SIGNING AND PAVEMENT MARKINGS**

**20.01 THERMOPLASTIC TRAFFIC STRIPES AND PAVEMENT MARKINGS**

- A. THERMOPLASTIC TRAFFIC STRIPES and pavement markings shall conform to the provisions in Section 84-1, "General," and Section 84-2, "Traffic Stripes and Pavement Markings", and Section 84-9 "Existing Markings" of the State Standard Specifications, unless otherwise noted herein.

Thermoplastic traffic stripes and pavement markings, where applicable, shall conform to the most current Caltrans Authorized Materials Lists (AML) maintained by the California Department of Transportation.

Thermoplastic material shall conform to the requirements of State Specification No. PTH-02ALKYD, and shall be of the Alkyd Thermoplastic type, manufactured by ENNIS-FLINT, or approved equal. All primers shall be per the manufacturer's specifications. Glass Beads shall be in accordance with Section 84-2.02B "Glass Beads" of the State Standard Specifications, Glass beads shall be Type 2, complying with AASHTO M47. Thermoplastic material for traffic stripes shall be applied at a minimum thickness of nine-hundredths (0.090) of an inch. Thermoplastic material for pavement legends and markings shall be applied at a minimum thickness of one-hundred-twenty-five thousandths (0.125) of an inch. Only extruded thermoplastic shall be used, sprayable thermoplastic shall not be acceptable.

Roadway surface preparation shall be completed prior to placement. Clean the pavement surface using high pressure water, compressed air, sandblasting, shot blasting, or mechanical abrasion. The surface should be visibly dry and moisture content should be tested according to ASTM D4263 (modified to 2 hours). New asphalt shall have been placed a minimum of 15 calendar days prior to installation of the colored pavement material and surface oils shall not be present. The temperature of the pavement and air shall be between 40°F - 104°F (5°C - 40°C).

- B. METHYL METHACRYLIC TRAFFIC STRIPES AND PAVEMENT MARKINGS - Traffic stripes and pavement markings on concrete pavement shall be methyl methacrylate (MMA) and shall conform to Section 84-2.02D and 84-2.03B (3) of the State Standard Specifications and these Standard Construction Specifications.

MMA traffic stripes and pavement markings must be supplied by Ennis-Flint or approved equal form the Caltrans Authorized Material List.

Roadway surface preparation shall be completed prior to placement. Clean the pavement surface using high pressure water, compressed air, sandblasting, shot blasting, or mechanical abrasion. The surface should be visibly dry and moisture content should be tested according to ASTM D4263 (modified to 2 hours). New asphalt

shall have been placed a minimum of 15 calendar days prior to installation of the colored pavement material and surface oils shall not be present. The temperature of the pavement and air shall be between 40°F - 104°F (5°C - 40°C).

C. GREEN COLORED BIKE STRIPES AND PAVEMENT MARKINGS - Green colored traffic stripes and pavement markings for bicycle lanes shall be placed where shown on the improvement plans or as directed by the City Engineer.

1. Materials - Green colored traffic stripes and pavement markings shall be Methyl Methacrylate (MMA) acrylic-based resin system used for color pavement markings and anti-skid surfacing. The resin, catalyst, and aggregate compound shall be capable of full cure in a wide range of temperatures, without requiring external heat sources.

2. Material Color - The daytime chromaticity coordinates for the color used for green colored pavement shall be in accordance with Section 84-2.01D (2) "Quality Control" of the State Standard Specifications.

The daytime luminance factor (Y) shall be at least seven (7) but not more than thirty-five (35).

The nighttime chromaticity coordinates for the color used for the green colored pavement shall be in accordance with Section 84-2.01D (2) "Quality Control" of the State Standard Specifications.

3. Surface Preparation - Clean the pavement surface using high pressure water, compressed air, sandblasting, shot blasting, or mechanical abrasion. The surface should be visibly dry and moisture content should be tested according to ASTM D4263 (modified to 2 hours). New asphalt shall have been placed a minimum of 15 calendar days prior to installation of the colored pavement material and surface oils shall not be present. The temperature of the pavement and air shall be between 40°F - 104°F (5°C - 40°C).

Before applying green colored traffic surfacing, stripes and pavement marking material, cover manholes, valves, monument covers, grates and other exposed facilities within the area of application, using a plastic or oil-resistant construction paper secured by tape of adhesive to the facility being covered.

All surfaces that are to receive colored pavement material shall be thoroughly clean, dry, and free of all dirt, grease, and other contaminants that might interfere with proper adhesion.

All areas to be coated shall be masked prior to application of primer and masked again prior to application of the green colored traffic stripes and pavement marking material.

4. Mixing and Application - Mixing and applying the green colored traffic stripes and pavement marking material and primer shall be in accordance with the manufacturer's instructions.

## **20.02 PAVEMENT MARKERS**

- A. PAVEMENT MARKERS SHALL conform to the provisions in Section 81-3, "Pavement Markers," of the State Standard Specifications and the most current Caltrans Authorized Materials Lists (AML) maintained by the California Department of Transportation, unless otherwise noted herein or on the project improvement plans. Certificates of Compliance shall be furnished for pavement markers to be used.
- B. HOT MELTED BITUMINOUS ADHESIVE SHALL BE used to apply the pavement markers to the pavement. The rapid set type epoxy adhesive shall not be used.
- C. HOT MELT BITUMINOUS ADHESIVE SHALL BE heated indirectly in an applicator with continuous agitation and shall be applied at a temperature between four hundred and four hundred-twenty-five (400 and 425) degrees Fahrenheit.
- D. BLAST CLEANING OF CLEAN, NEW ASPHALT concrete surfaces will not be required.

## **20.03 MARKERS**

- A. MARKERS SHALL CONFORM TO the provisions in Section 81-3, "Pavement Markers," and Section 82-5 "Markers," of the State Standard Specifications, unless otherwise noted herein.
- B. MARKERS ON FLEXIBLE POSTS SHALL BE furnished by the Contractor and shall be as specified in the most current Caltrans Authorized Materials Lists (AML) maintained by the California Department of Transportation. Flexible posts shall be made from a flexible plastic which shall be resistant to impact, ultraviolet light, ozone and hydrocarbons. Flexible posts shall resist stiffening with age and shall be free of burns, discoloration, contamination, and other objectionable marks and defects, which affect appearance or serviceability.
- C. REFLECTIVE SHEETING FOR METAL AND flexible target plates shall be the reflective sheeting designated for channelizers, markers, and delineators specified in the most current prequalified and tested signing and delineation materials and products list maintained by the California Department of Transportation.

## **20.04 REMOVAL OF EXISTING TRAFFIC STRIPING AND PAVEMENT MARKINGS**

- A. REMOVAL OF EXISTING TRAFFIC STRIPING and pavement markings shall conform to the provisions in Section 15, "Existing Highway Facilities" and Section 84-9 "Existing Markings" of the State Standard Specifications, unless otherwise noted herein.
- B. NOTHING IN THESE SPECIFICATIONS SHALL relieve the Contractor from responsibilities as provided in Section 7-1.04, "Public Safety," of the State Standard Specifications.
- C. CONFLICTING STRIPING AND PAVEMENT MARKINGS SHALL BE removed before the installation of new striping and pavement markings. All traffic striping and pavement markings shall be removed in a rectangular shape no more than one-eighth inch (1/8).

New striping and pavement markings shall be installed within 24 hours of removal of old striping and pavement markings.

- D. WHERE GRINDING OR SANDBLASTING IS USED FOR the removal of existing traffic striping and pavement markings, and such removal operation is being performed within ten (10) feet of a lane occupied by public traffic, the residue including dust shall be removed immediately after contact between the grinding or sand-blasting material and the surface being treated. Such removal shall be by a vacuum attachment operating concurrently with the grinding or sand-blasting operation. After the removal of existing traffic striping and pavement markings on asphalt concrete pavement, a fog seal coat shall be applied to the surface of grinding or sand-blasting areas in accordance with the provisions in Section 37, "Seal Coats," of the State Standard Specifications. Painting over existing pavement markers with black paint or spraying with asphalt shall not be accepted as a substitute for removal. Some yellow paint striping and thermoplastic markings installed previously may consist, in part, of chromium, lead, or other constituents which are classified as hazardous waste in high concentrations.

#### **20.05 REMOVAL OF EXISTING PAVEMENT MARKERS**

- A. REMOVAL OF EXISTING PAVEMENT markers shall conform to the provisions in Section 15, "Existing Highway Facilities" and Section 81-8.03B "Remove Pavement Markers" of the State Standard Specifications unless otherwise noted herein.
- B. EXISTING PAVEMENT MARKERS, when no longer required for traffic lane delineation as shown on the plans, or as directed by the City Engineer, shall be removed and properly disposed of.
- C. EXISTING PAVEMENT MARKERS, which are to be removed, shall be done so in such a manner as to leave the existing asphalt concrete pavement undamaged. Damage to the asphalt concrete resulting from the removal of pavement markers shall be considered as any depression more than one-eighth (1/8) inch deep. Should any asphalt concrete pavement be damaged or removed, it shall be patched using Type A, No. 4 maximum asphalt concrete.

#### **20.06 ROADWAY SIGNS**

Roadway signs shall conform to these specification, City Standard Details and Section 82 "Signs and Markers" of the State Standard Specifications, California "Manual of Traffic Control Devices (MUTCD)," and FHWA "Standard Highway Signs and Markings," and the most current Caltrans Authorized Materials Lists (AML) maintained by the California Department of Transportation. Protective graffiti sheeting may be required by the City Engineer and shall conform to the provisions of Section 78 "Incidental Construction," of the State Standard Specifications.

## **20.07 RETROFLECTIVE STREET NAME SIGNS**

- A. RETROFLECTIVE ROADSIDE STREET name sign shall be in accordance with City Standard Details # 245, 251 & 252. Retroreflective street name signs mounted on traffic signal mast arms shall be furnished and installed at signalized intersections of streets other than major arterials per City Standard Detail #253. Sign colors shall be white lettering on a green background.
- B. RETROFLECTIVE STREET NAME SIGNS shall be installed on traffic signal mast arms at the locations shown on the Signal and Lighting construction plans or as shown on City Standard Detail #253. The mounting hardware and sign shall be assembled, and the assembly shall be attached to the mast arm using three-quarter (3/4) inch x three-hundredths (0.03) inch stainless steel band compliant with ASTM A167, Type 302B. The band shall be wrapped at least twice around the mast arm, tightened and secured with a stainless strap seal in the same manner as for strap and saddle bracket sign mounting. Theft-proof bolts shall be stainless steel with a chromium content of seventeen percent (17) and a nickel content of at least eight percent (8%). All mounting hardware shall be furnished by the Contractor. The sign panel shall be leveled, and all hardware tightened securely, and mounted with its face parallel to the streets they name.

## **20.08 INTERNALLY ILLUMINATED STREET NAME SIGNS**

- A. INTERNALLY ILLUMINATED STREET NAME signs on traffic signals shall be furnished and installed per the City's Authorized Material List, State Standard Specifications and manufacturer's specifications. The mounting hardware and sign shall be assembled, and the assembly shall be attached to the mast arm following the City's Authorized Material List, State Standard Specifications, and manufacturer's specifications. The band shall be wrapped at least twice around the mast arm, tightened, and secured with a stainless strap seal. All mounting hardware shall be furnished by the Contractor. The sign panel shall be leveled, and all hardware tightened securely, and mounted with its face parallel to the streets they name.
- B. PHOTOELECTRIC CONTROL FOR INTERNALLY illuminated street name signs shall be operated together with a Type II Photoelectric control. Contactors shall be mechanical armature type.

## **20.09 PREQUALIFIED AND TESTED SIGNING AND DELINEATION MATERIALS**

- A. THE CALIFORNIA DEPARTMENT OF TRANSPORTATION maintains a trade name list of approved prequalified and tested signing and delineation materials and products. Approval of prequalified and tested products and materials shall not preclude the City Engineer from sampling and testing any of the signing and delineation materials or products at any time.

- B. LISTING OF APPROVED PREQUALIFIED AND tested signing and delineation materials and products cover the following:

**MATERIALS and PRODUCTS:**

Temporary pavement markers  
Striping and pavement marking tape  
Pavement markers, reflective and non-reflective  
Flexible Class 1 delineators and channelizers  
Railing and barriers delineators  
Sign sheeting and base materials  
Reflective sheeting for barricades  
Reflective sheeting for channelizers  
Reflective sheeting for markers and delineators  
Reflective sheeting for traffic cone sleeves  
Reflective sheeting for barrels and drums

- C. NONE OF THE ABOVE LISTED SIGNING and delineation materials and products shall be used in the work unless such material or product is listed on the California Department of Transportation Authorized Material Lists.
- D. A CERTIFICATE OF COMPLIANCE SHALL BE furnished as specified in Section 6-2.03C, "Certificates of Compliance," of the State Standard Specifications for signing and delineation materials and products. Said certificate shall also certify that the signing and delineation material or product conforms to the pre-qualified testing and approval of the California Department of Transportation, Division of Traffic Operations and was manufactured in accordance with the approved quality control program.

## **20.10 MEASUREMENT AND PAYMENT**

- A. ALL THERMOPLASTIC TRAFFIC STRIPES shall be measured by the linear foot on-center along the line of the traffic stripe, without deductions for gaps in broken (skipped) traffic stripes. The Contract Payment for all thermoplastic traffic stripes of the widths designated in the contract documents, shall be per linear foot and shall include full compensation for furnishing all labor, material, tools, equipment, primer, incidentals and establishing alignment to completely install the thermoplastic traffic stripes and no additional compensation will be allowed therefor.
- B. ALL THERMOPLASTIC PAVEMENT MARKINGS and legends shall be measured by the square foot of the actual area covered. The Contract Payment for all thermoplastic pavement markings and legends shall be paid for by the square foot of actual area covered and shall include full compensation for furnishing all labor, material, tools, equipment, primer, incidentals and lay-out work to completely install the

thermoplastic pavement markings and legends and no additional compensation will be allowed therefor.

- C. ALL METHYL METHACRYLATE (MMA) PAVEMENT lane traffic and bicycle lane striping, markings and legends shall be measured by the square foot of the actual area covered and shall include full compensation for furnishing all labor, material, tools, equipment, primer, incidentals, and lay-out work to completely install the MMA pavement striping, markings and legends and no additional compensation will be allowed therefor.
- D. ALL PAVEMENT MARKERS SHALL BE MEASURED for each for reflective and non-reflective types. Contract Payment for blue markers shall be included in the price to install fire hydrant assembly when fire hydrants are installed and include full compensation for furnishing all labor, material, tools, equipment, adhesive and all other incidentals to completely install the pavement markers. The Contract Payment lump sum or unit price for all other pavement markers shall include full compensation for furnishing all labor, material, tools, equipment, adhesive and all other incidentals to completely install the pavement marker as shown on the improvement plans and/or specified herein, complete and in place and no additional compensation will be allowed therefor.
- E. ALL EXISTING TRAFFIC STRIPING TO BE REMOVED shall be measured by the linear foot along the line of the actual striping removed, with deduction for gaps in dash stripes. All existing traffic pavement markings to be removed shall be measured by the square foot of the actual area removed. The Contract Payment for all units measured shall include all labor, materials, tools, equipment, and incidentals for removing existing traffic striping and pavement markings and applying fog seal coat, all in accordance with the plans, these specifications, Section 37-4.02 "Fog Seals" of the State Standard Specifications, and as directed by the City Engineer and no additional compensation will be allowed therefor.
- F. THE CONTRACT PAYMENT FOR ALL PAVEMENT markers removed shall include all labor, materials, tools, equipment, and incidentals for removing existing pavement markers all in accordance with the plans, specifications, and as directed by the City Engineer, and no additional compensation will be allowed therefor.
- G. THE CONTRACT UNIT PRICE OR LUMP SUM PRICE paid for roadside signs shall include all labor, materials, tools, equipment, concrete, and incidentals for installing the roadside signs complete, and no additional compensation will be allowed therefor.
- H. PAYMENT FOR FURNISHING AND INSTALLING non-illuminated and internally illuminated street name signs and other sign panels on traffic signal standards and mast arms, including furnishing all mounting hardware, shall be considered as included in the contract price paid for traffic signal and streetlighting bid items and no separate payment will be made, therefore.