

California Manual on Uniform Traffic Control Devices

for Streets and Highways

(FHWA's MUTCD 2003 Edition
including Revisions 1 and 2,
as amended for use in California)

PART 3 Markings



STATE OF CALIFORNIA
BUSINESS, TRANSPORTATION AND HOUSING AGENCY
DEPARTMENT OF TRANSPORTATION

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PART 3. MARKINGS

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CHAPTER 3A. GENERAL

Section 3A.01 Functions and Limitations

Support:

Markings on highways have important functions in providing guidance and information for the road user. Major marking types include pavement and curb markings, object markers, delineators, colored pavements, barricades, channelizing devices and islands. In some cases, markings are used to supplement other traffic control devices such as signs, signals and other markings. In other instances, markings are used alone to effectively convey regulations, guidance, or warnings in ways not obtainable by the use of other devices.

Markings have limitations. Visibility of the markings can be limited by snow, debris, and water on or adjacent to the markings. Marking durability is affected by material characteristics, traffic volumes, weather, and location. However, under most highway conditions, markings provide important information while allowing minimal diversion of attention from the roadway.

Pavement markings can enhance roadway delineation with the addition of audible and tactile features such as bars, differential surface profiles, raised pavement markers, or other devices intended to alert the road user that a delineation on the roadway is being traversed.

The general functions of longitudinal lines are:

- A. A double line indicates maximum or special restrictions,
- B. A solid line discourages or prohibits crossing (depending on the specific application),
- C. A broken line indicates a permissive condition, and
- D. A dotted line provides guidance.

Section 3A.02 Standardization of Application

Standard:

Each standard marking shall be used only to convey the meaning prescribed for that marking in this Manual. When used for applications not described herein, markings shall conform in all respects to the principles and standards set forth herein.

Guidance:

Before any new highway, paved detour, or temporary route is opened to traffic, all necessary markings should be in place.

Standard:

Markings that are no longer applicable for roadway conditions or restrictions and that might cause confusion for the road user shall be removed or obliterated to be unidentifiable as a marking as soon as practical. Markings that must be visible at night shall be retroreflective unless ambient illumination assures that the markings are adequately visible. All markings on Interstate highways shall be retroreflective.

Option:

Markings may be temporarily masked with tape until they can be removed or obliterated.

Standard:

All longitudinal pavement markings shall be retroreflective except non-reflective pavement markers and directional markings for tourists. Refer to CVC 21374.

Guidance:

If used, the masking tape should match the pavement surface color and not provide undue contrast.

Support:

Use of black tape for temporary "masking" is effective for new Asphalt Concrete pavement. However, for faded Asphalt Concrete pavement or Portland Cement Concrete pavements, black "masking" pavement markings could appear as a stripe in low light conditions and result in confusion to road users.

Section 3A.03 Materials

Support:

Pavement and curb markings are commonly placed by using paints or thermoplastics; however, other suitable marking materials, including raised pavement markers and colored pavements, are also used.

Delineators, object markers, barricades, and channelizing devices are visibly placed in a vertical position similar to signs above the roadway.

Guidance:

The materials used for markings should provide the specified color throughout their useful life.

Consideration should be given to selecting pavement marking materials that will minimize tripping or loss of traction for pedestrians and bicyclists.

Object markers and delineators should not present a vertical or horizontal clearance obstacle for pedestrians.

Section 3A.04 Colors

Standard:

Markings shall be yellow, white, red, green or blue. The colors for markings shall conform to the standard highway colors. Black in conjunction with one of the above colors shall be a usable color.

The color of curb markings shall conform to CVC 21458. Refer to CVC 21374 for exceptions.

When used, white markings for longitudinal lines shall delineate:

- A. The separation of traffic flows in the same direction.
- B. The right edge of the roadway.

When used, yellow markings for longitudinal lines shall delineate:

- A. The separation of traffic traveling in opposite directions.
- B. The left edge of the roadways of divided and one-way highways and ramps.
- C. The separation of two-way left turn lanes and reversible lanes from other lanes.

When used, red raised pavement markers shall delineate roadways that shall not be entered or used.

Support:

Red pavement markers are used to alert possible wrong way drivers on freeways as shown in Figure 3A-102(CA), Details 14 and 14A.

When used, blue markings shall supplement white markings for parking spaces for persons with disabilities. When used, blue raised pavement markers shall indicate locations of fire hydrants along a roadway.

Option:

Black may be used in combination with the above colors where a light-colored pavement does not provide sufficient contrast with the markings.

A 75 mm (3 in) black line may be placed between the 100 mm (4 in) wide yellow lines on streets and highways under local jurisdiction.

Standard:

A 75 mm (3 in) black line shall be placed between the 100 mm (4 in) wide yellow lines on State highways.

Support:

When used in combination with other colors, black is not considered a marking color, but only a contrast-enhancing system for the markings.

Section 3A.05 Widths and Patterns of Longitudinal Pavement Markings

Standard:

The widths and patterns of longitudinal lines shall be as follows:

- A. A normal line is 100 to 150 mm (4 to 6 in) wide.
- B. A wide line is at least twice the width of a normal line. The width of the line indicates the degree of emphasis.
- C. A double line consists of two parallel lines separated by a discernible space.
- D. A broken line consists of normal line segments separated by gaps.
- E. A dotted line shall consist of noticeably shorter line segments separated by shorter gaps than used for a broken line. The width of a dotted line shall be at least the same as the width of the line it extends.

Guidance:

Broken lines should consist of 3 m (10 ft) line segments and 9 m (30 ft) gaps, or dimensions in a similar ratio of line segments to gaps as appropriate for traffic speeds and need for delineation.

Option:

A dotted line for line extensions may consist of 0.6 m (2 ft) line segments and 0.6 m (2 ft) to 1.8 m (6 ft) gaps. A dotted line for lane drop/add markings may consist of 0.9 m (3 ft) line segments and 2.7 m (9 ft) gaps.

Standard:

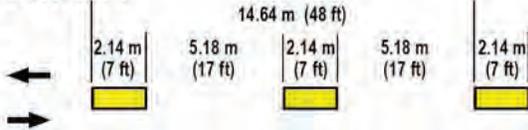
The widths and patterns of longitudinal lines shall conform to the details shown in Figures 3A-101(CA) through 3A-112(CA).

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Figure 3A-101 (CA). Centerlines - 2 Lane Highways

FOR SPEEDS 65 km/h (40 mph) OR LESS

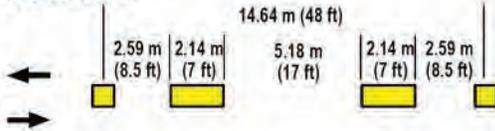
DETAIL 1



POLICY

Centerline pattern for use on two-lane streets and highways (normally used on local streets and highways).

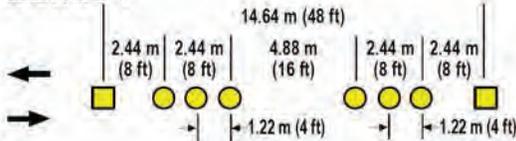
DETAIL 2



Centerline pattern with pavement markers for use on two-lane streets and highways.

**DETAIL 3
(Deleted)**

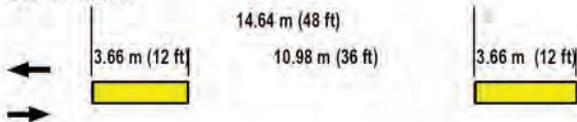
DETAIL 4



Alternate to Detail 2. For use at problem locations where it is difficult to place and maintain centerline because of moisture, sand, etc.

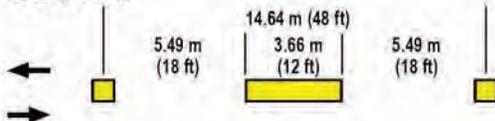
FOR SPEEDS 70 km/h (45 mph) OR MORE

DETAIL 5



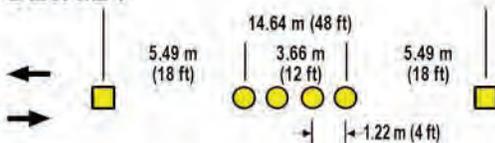
Centerline pattern for use on two-lane streets and highways (normally used on local streets and highways).

DETAIL 6



Centerline pattern with pavement markers for use on two-lane streets and highways.

DETAIL 7



Alternate to Detail 6. For use at problem locations where it is difficult to place and maintain centerline because of moisture, sand, etc.

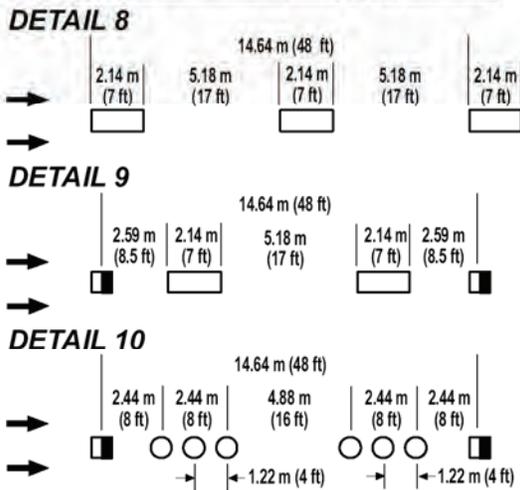
LEGEND

- 100 mm (4 in) Yellow
- Two-Way Yellow Retroreflective Markers
- Direction of Travel
- Non-Retroreflective Yellow Markers

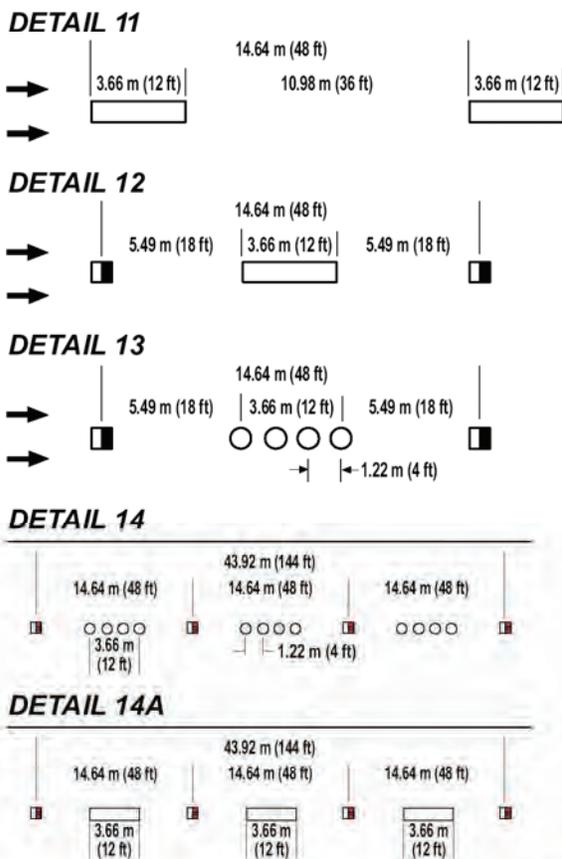
NOT TO SCALE

Figure 3A-102 (CA). Lane Lines - Multilane Highways

FOR SPEEDS 65 km/h (40 mph) OR LESS



FOR SPEEDS 70 km/h (45 mph) OR MORE



POLICY

Lane Line pattern for use on multilane streets and highways (normally used on local streets and highways).

Lane Line pattern with pavement markers for use on multilane streets, highways and freeway ramps.

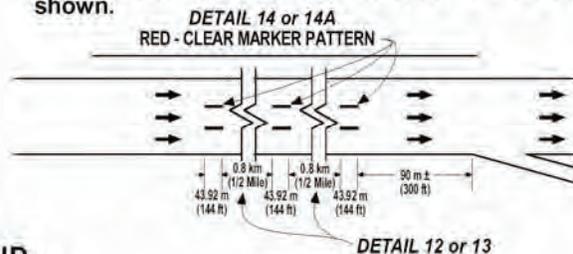
Lane Line pattern with pavement markers for use on multilane streets, highways and freeway ramps.

Lane Line pattern for use on multilane streets and highways (normally used on local streets and highways).

Lane Line pattern with pavement markers for use on multilane conventional streets and highways, State freeways, expressways, freeway ramps, freeway to freeway connectors and collector roads. See Detail 14A.

Lane Line pattern with pavement markers for use on State freeways, expressways, freeway ramps, freeway to freeway connectors and collector roads. See Detail 14.

Lane Line pattern with red-clear pavement markers shall be used on freeways approaching exit ramps. Detail 14 is used with Detail 13 and Detail 14A is used with Detail 12, in a pattern of four red-clear pavement markers, at intervals as shown.



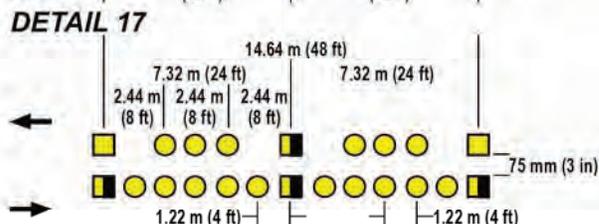
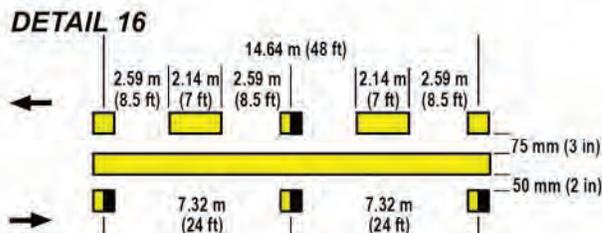
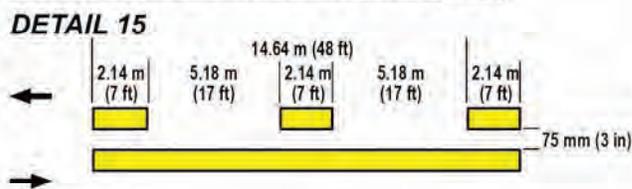
LEGEND

- 100 mm (4 in) White
- One-Way Clear Retroreflective Markers
- Non-Retroreflective White Markers
- Red-Clear Retroreflective Markers
- Direction of Travel

NOT TO SCALE

Figure 3A-103 (CA). No Passing Zones - One Direction

FOR SPEEDS 65 km/h (40 mph) OR LESS



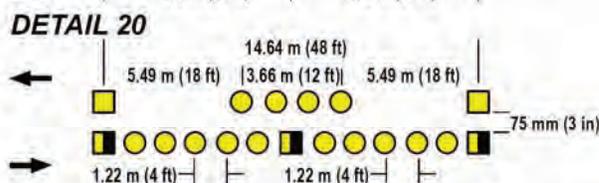
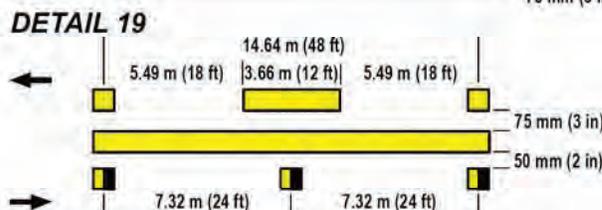
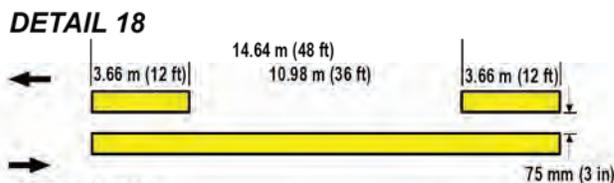
POLICY

One direction no-passing pattern for use on two-lane streets and highways (normally used on local streets and highways). See Note 2.

One direction no-passing pattern with pavement markers for use on two-lane streets and highways. See Notes 1 and 2.

Alternate to Detail 16. For use with Detail 4.

FOR SPEEDS 70 km/h (45 mph) OR MORE



One direction no-passing pattern for use on two-lane streets and highways (normally used on local streets and highways). See Note 2.

One direction no-passing pattern with pavement markers for use on two-lane streets and highways. See Notes 1 and 2.

Alternate to Detail 19. For use with Detail 7.

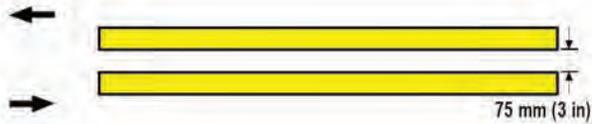
- NOTES:** 1. Pavement markers shown off the solid line in Details 16 and 19 may be placed on the line.
 2. A 75 mm (3 in) black line shall be placed between the 100 mm (4 in) yellow lines on State highways and may be placed on streets and highways under local jurisdiction.

LEGEND

- 100 mm (4 in) Yellow
 - Two-Way Yellow Retroreflective Markers
 - Non-Retroreflective Yellow Markers
 - Direction of Travel
 - One-Way Yellow Retroreflective Markers
- NOT TO SCALE**

Figure 3A-104 (CA). No Passing Zones - Two Direction

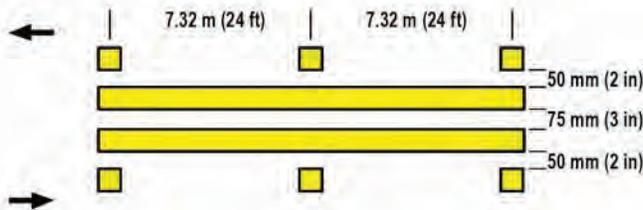
DETAIL 21



POLICY

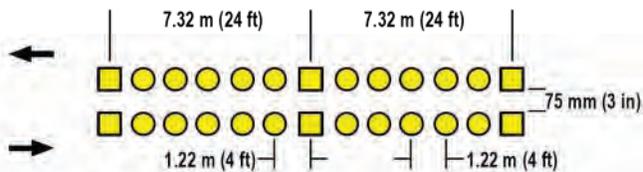
Two-direction no-passing pattern for use on two-lane streets and highways (normally used on local streets and highways). See Note 2.

DETAIL 22



Two-direction no-passing pattern with pavement markers for use on two-lane streets and highways. See Notes 1 and 2.

DETAIL 23



Alternate to Detail 22. For use with either Detail 4 or Detail 7.

- NOTES:**
1. Pavement markers shown off the solid line in Detail 22 may be placed on the line.
 2. A 75 mm (3 in) black line shall be placed between the 100 mm (4 in) yellow lines on State highways and may be placed on streets and highways under local jurisdiction.

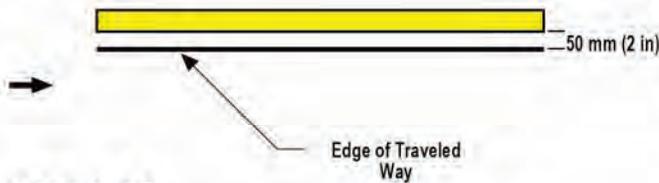
LEGEND

- 100 mm (4 in) Yellow
- Two-Way Yellow Retroreflective Markers
- Direction of Travel
- Non-Retroreflective Yellow Markers

NOT TO SCALE

Figure 3A-105 (CA). Left Edge Lines for Divided Highways

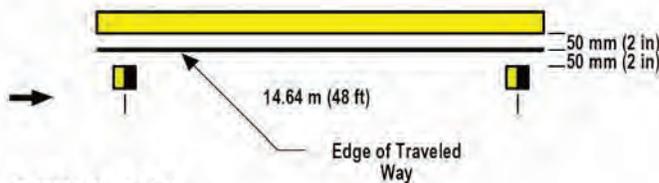
DETAIL 24



POLICY

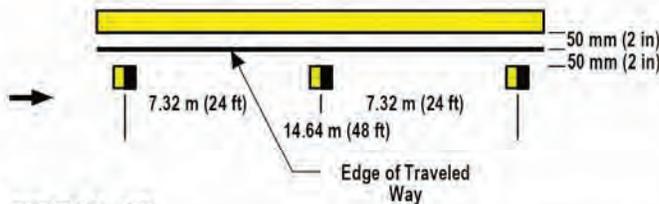
Left Edge Line pattern for use on streets and highways (normally used on local streets and highways).

DETAIL 25



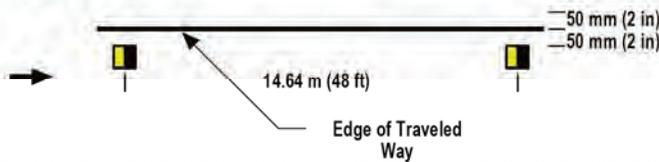
Left Edge Line for use on State highways.

DETAIL 25A



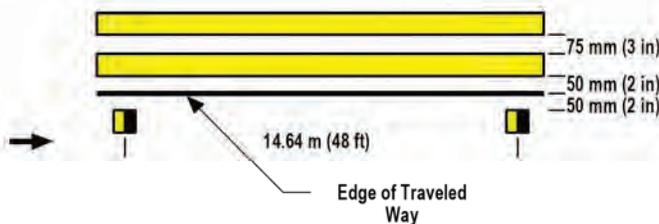
Left Edge Line for use on freeway ramps and connectors.

DETAIL 26



Alternate to Details 24 and 25 when there is adequate contrast between travelled way and shoulder.

DETAIL 27



Alternate to Detail 25. A double solid yellow line may be used for more emphasis when motorists tend to use the shoulder for a through lane, or where encroachments onto the shoulder occasionally occur. See Note 1.

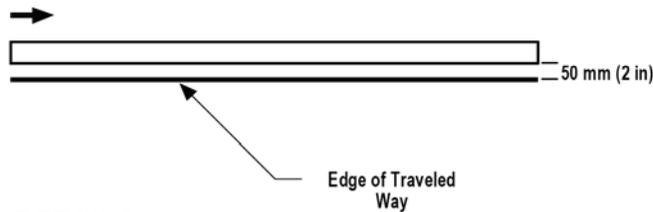
NOTE: 1. A 75 mm (3 in) black line shall be placed between the 100 mm (4 in) yellow lines on State highways and may be placed on streets and highways under local jurisdiction.

LEGEND

- 100 mm (4 in) Yellow
 - 75 mm (3 in)
 - One-Way Yellow Retroreflective Markers
 - Direction of Travel
- NOT TO SCALE

Figure 3A-106 (CA). Right Edge Line and Right Edge Line Extension Through Intersections

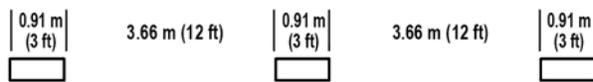
DETAIL 27B
Right Edge Line



POLICY

Right Edge Line pattern for use on all State highways may be used on local streets and highways. It is generally dropped at the beginning of the intersection flares on conventional highways. See also Detail 27C. On freeways, it may be flared in advance of the exit ramp as shown in Figure 3B-8 (CA).

DETAIL 27C
Right Edge Line Extension Through Intersections



Right Edge Line Extension Through Intersections pattern for use to extend the right edgeline through an intersection where climatic conditions, such as areas of heavy fog, may require additional guidance.

LEGEND

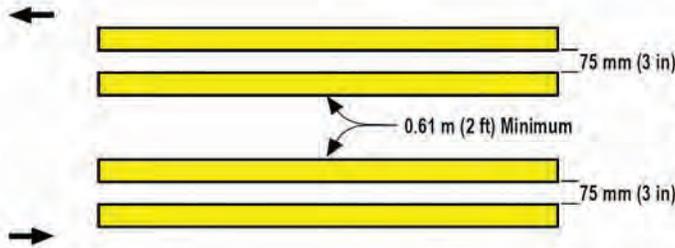


NOT TO SCALE

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Figure 3A-107 (CA). Median Islands

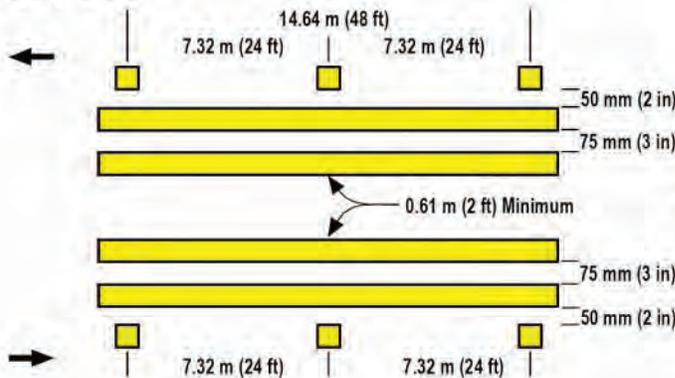
DETAIL 28



POLICY

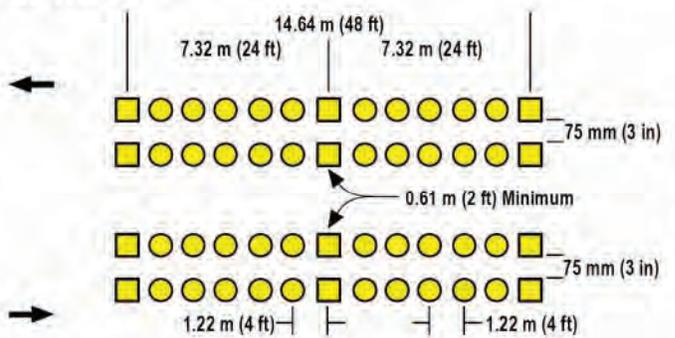
Double Left Edge Line pattern for use on all-paved sections of streets and highways (normally used on local streets and highways). See Note 2.

DETAIL 29



Double Left Edge Line pattern with pavement markers for use on all-paved sections of streets and highways. See Notes 1 and 2.

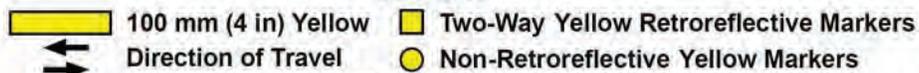
DETAIL 30



Alternate to Detail 29. For use at problem locations where it is difficult to place and maintain lines because of moisture, sand, etc.

- NOTES:**
1. Pavement markers shown off the solid line in Detail 29 may be placed on the line.
 2. A 75 mm (3 in) black line shall be placed between the 100 mm (4 in) yellow lines on State highways and may be placed on streets and highways under local jurisdiction.

LEGEND



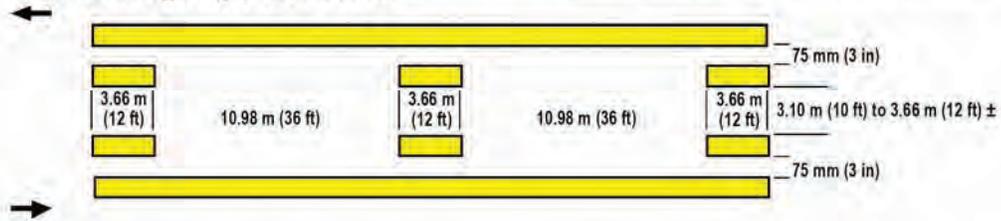
NOT TO SCALE

Figure 3A-108 (CA). Two-Way Left-Turn Lanes

DETAIL 31

POLICY

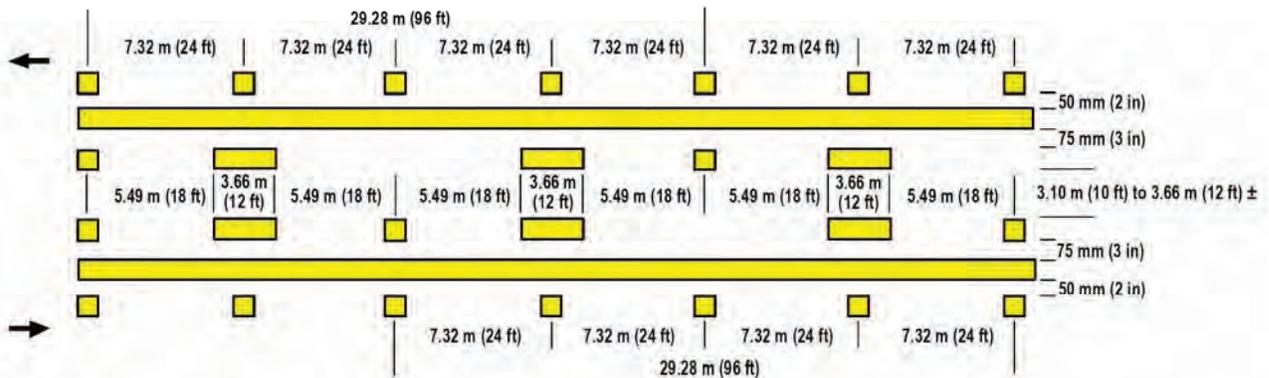
Two-way left-turn lane pattern for use on streets and highways (normally used on local streets and highways). See Note 2.



DETAIL 32

POLICY

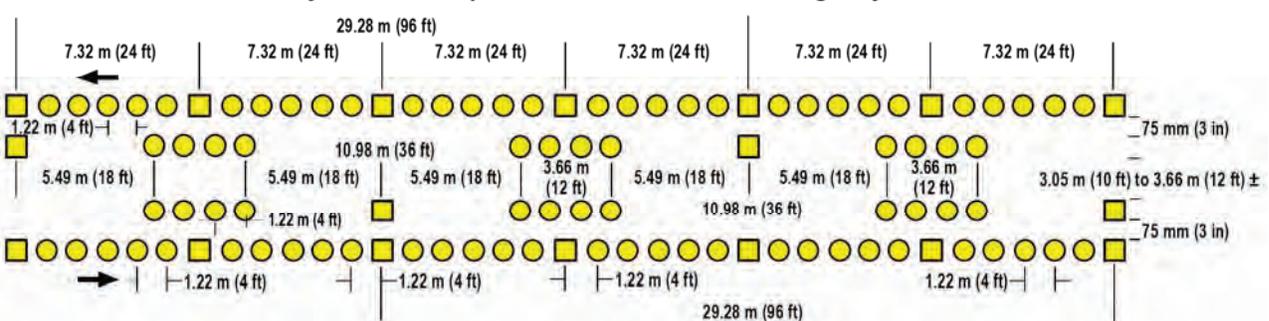
Two-way left-turn lane pattern for use on streets and highways. See Note 2.



DETAIL 33

POLICY

Two-way left-turn lane pattern for use on streets and highways.



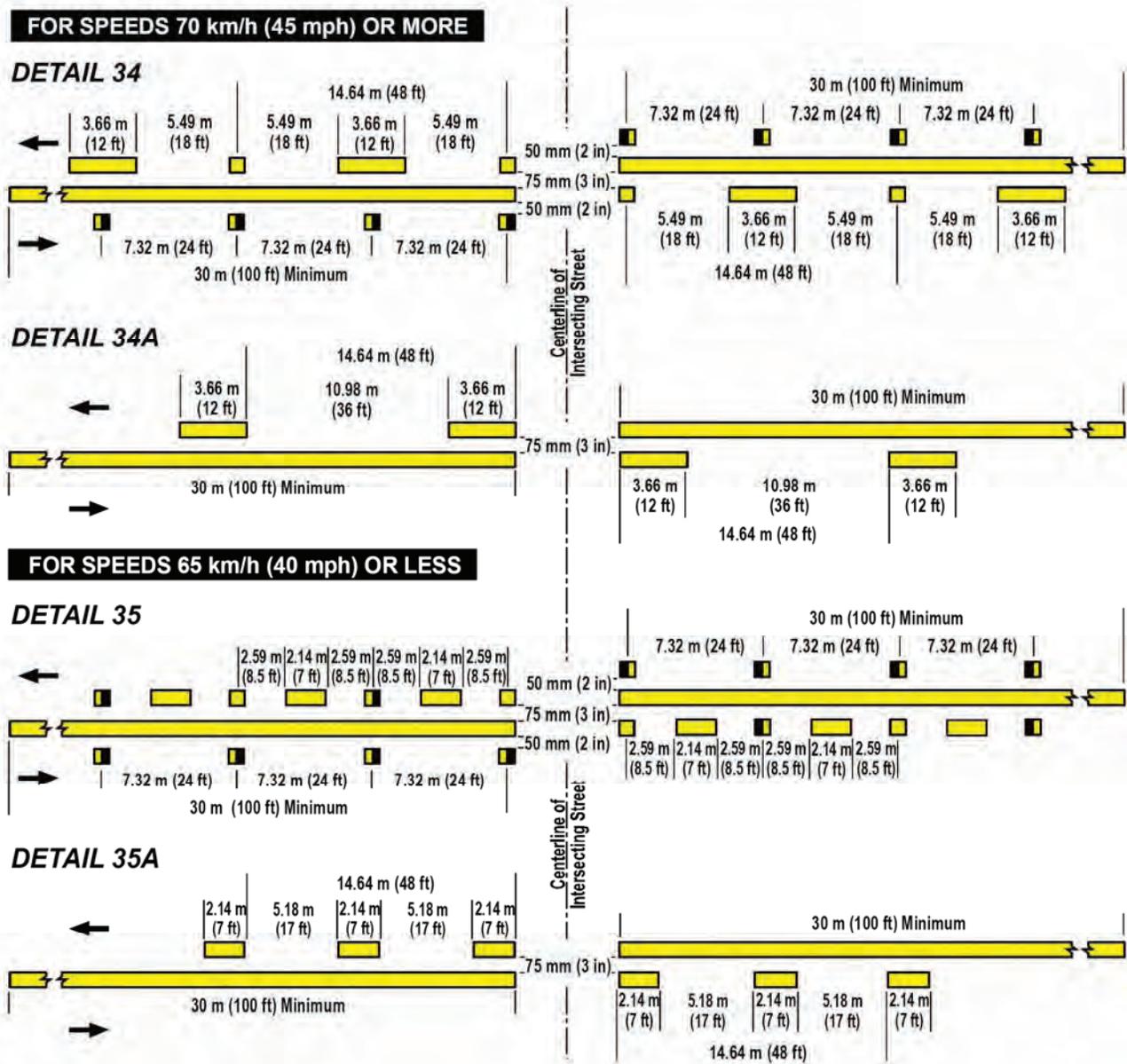
- NOTES:**
1. Pavement markers shown off the solid line in Detail 32 may be placed on the line.
 2. A 75 mm (3 in) black line shall be placed between the 100 mm (4 in) yellow lines on State highways and may be placed on streets and highways under local jurisdiction.

LEGEND

- 100 mm (4 in) Yellow
- Two-Way Yellow Retroreflective Markers
- Direction of Travel
- Non-Retroreflective Yellow Markers

NOT TO SCALE

Figure 3A-109 (CA). Intersection Markings



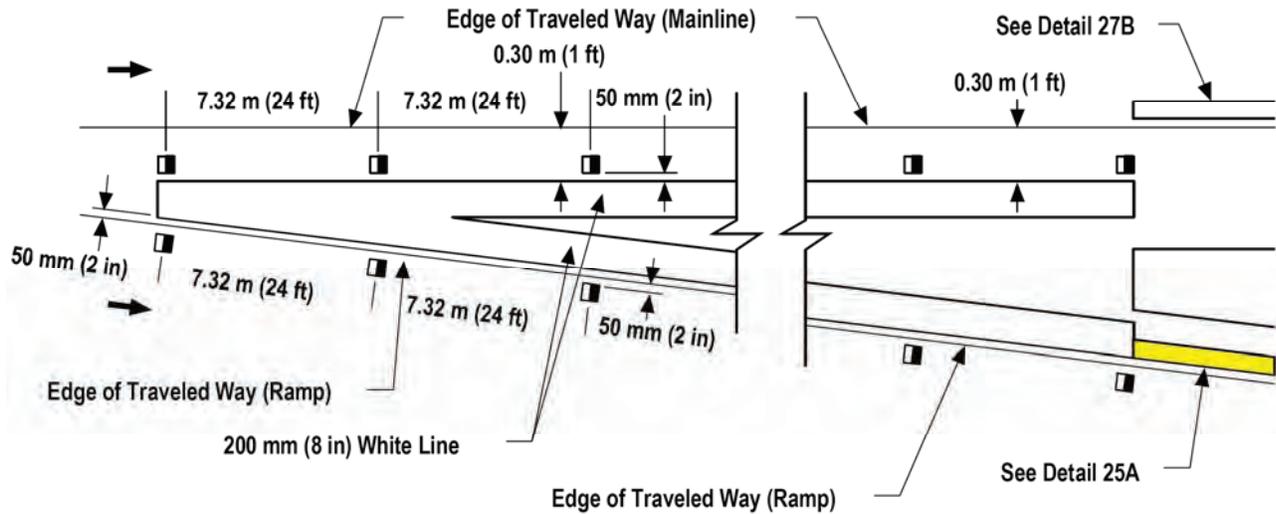
- NOTES:**
1. Raised Pavement Markers are optional on non-state highways.
 2. Raised Pavement Markers shown off the solid line may be placed on the line.
 3. A 75 mm (3 in) black line shall be placed between the 100 mm (4 in) yellow lines on State highways and may be placed on streets and highways under local jurisdiction.

LEGEND

- | | | |
|--|--|---------------------|
|  100 mm (4 in) Yellow |  Two-Way Yellow Retroreflective Markers | NOT TO SCALE |
|  Direction of Travel |  One-Way Yellow Retroreflective Markers | |

**Figure 3A-110 (CA). Freeway Exit and Entrance Ramp Channelizing Line
 (Sheet 1 of 2)**

**DETAIL 36 - Exit Ramp Neutral Area (Gore) Channelizing Lines
 (See Figure 3B-8 (CA), Sheet 2 of 2)**



LEGEND

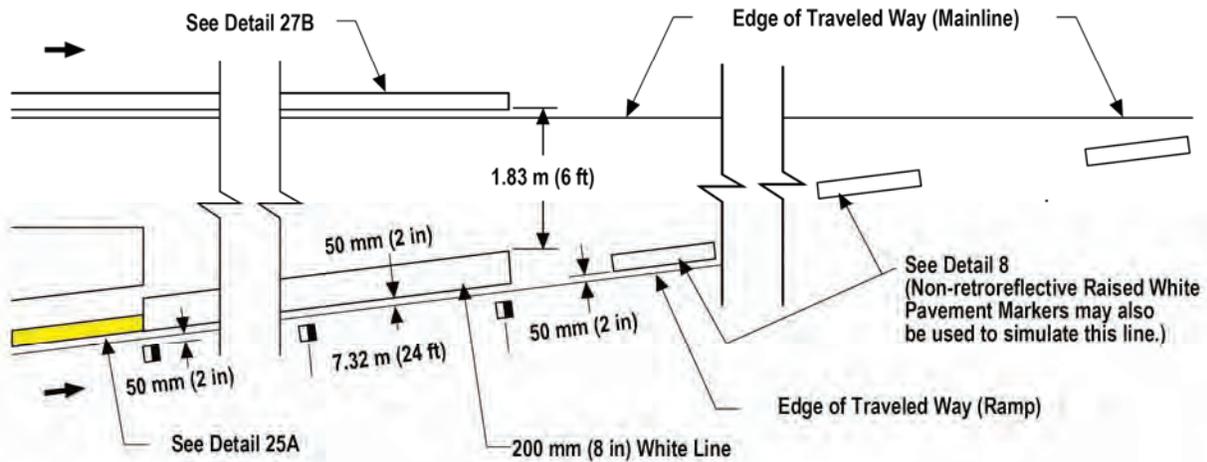
- 100 mm (4 in) White
- One-Way Clear Retroreflective Markers
- 100 mm (4 in) Yellow
- Direction of Travel

NOT TO SCALE

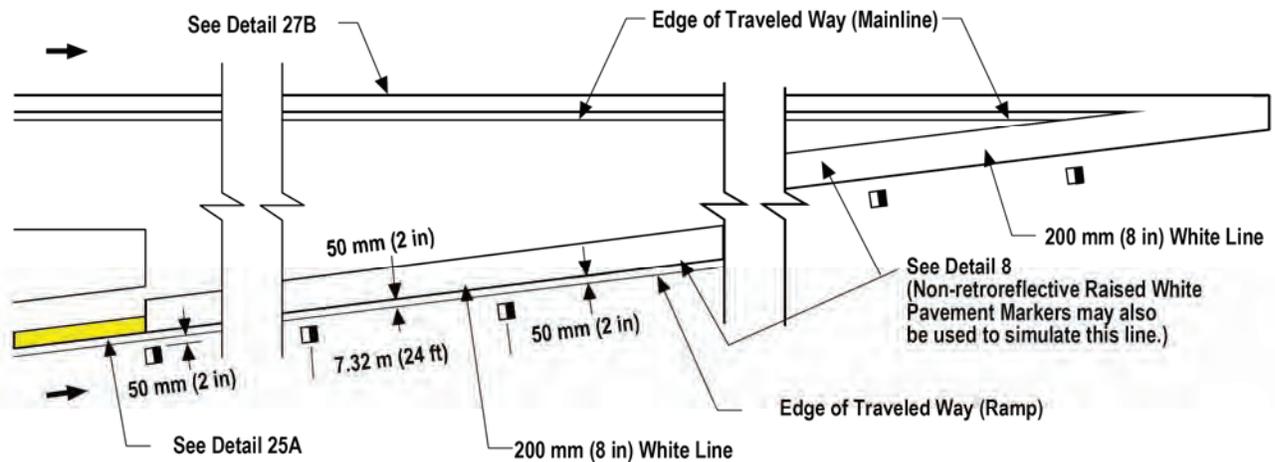
(This space left intentionally blank)

**Figure 3A-110 (CA). Freeway Exit and Entrance Ramp Channelizing Lines
 (Sheet 2 of 2)**

**DETAIL 36A - Entrance Ramp Neutral Area (Merge) Channelizing Lines
 (See Figure 3B-9 (CA), Sheet 1 of 2)**



**DETAIL 36B - Entrance Ramp Neutral Area (Acceleration Lane) Channelizing Lines
 (See Figure 3B-8 (CA), Sheet 3 of 3)**



LEGEND

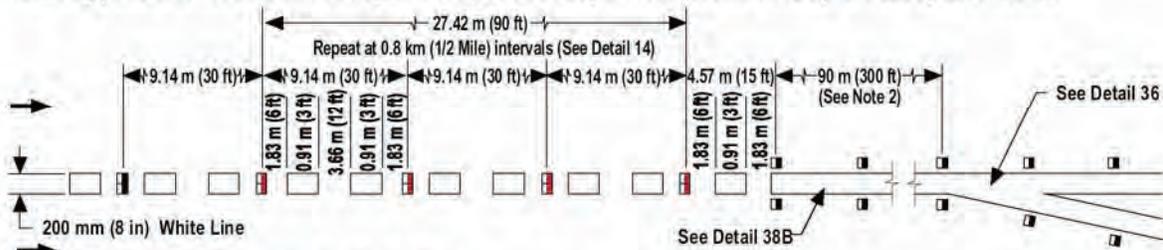
-  100 mm (4 in) White
-  100 mm (4 in) Yellow
-  One-Way Clear Retroreflective Markers
-  Direction of Travel

NOT TO SCALE

Figure 3A-111 (CA). Lane Drop Markings

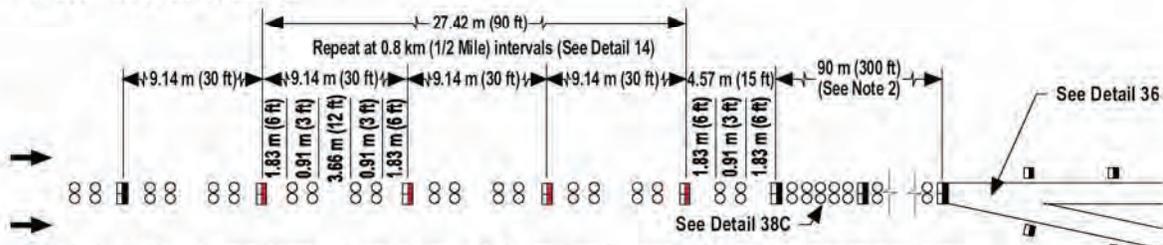
DETAIL 37 - Lane Drop Markings at Exit Ramps

Marking pattern for use on mandatory lane drops at freeway exit ramps and freeway to freeway connectors.



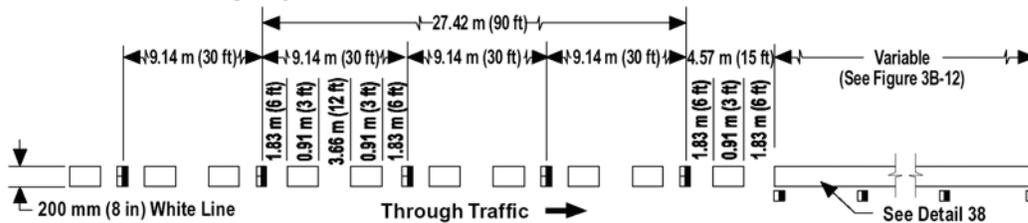
DETAIL 37A - Alternate to Detail 37

For use with Detail 10 and 13.



DETAIL 37B - Lane Drop Markings at Conventional Highway Intersections

Marking pattern for use on mandatory turn lanes at intersections. Pavement markers shown are optional on local streets and highways.



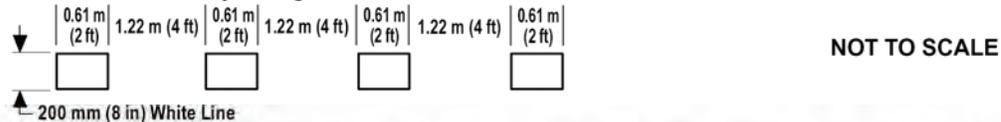
DETAIL 37C - Alternate to Detail 37B

For use with Detail 10 and 13.



DETAIL 37D - Lane Drop Line For Two-Lane Roundabouts

For use on mandatory exiting lanes from two-lane roundabouts.



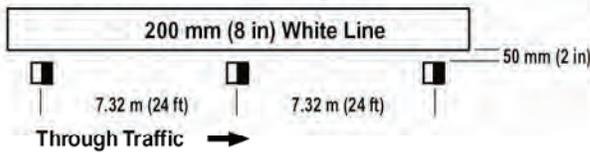
- NOTES: 1. Pavement markers shown off the solid line in Detail 37 may be placed on the line.
 2. The Solid Channelizing Line shown in Detail 37 and 37A may be omitted on short auxiliary lanes where weaving length is critical.

LEGEND

- 88 Non-Retroreflective White Markers
- ➔ Direction of Travel
- ▬ One-Way Clear Retroreflective Markers
- ▬ Red-Clear Retroreflective Markers

Figure 3A-112 (CA). Channelizing Line and Lane Line/Centerline Extensions

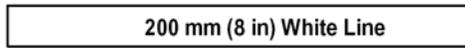
DETAIL 38 - Channelizing Line



POLICY

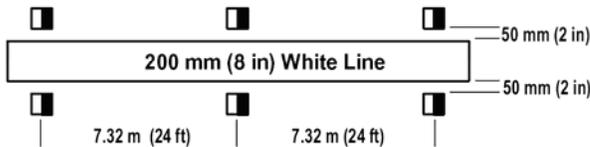
Typical channelizing line for use on Left-Turn or Right-Turn lanes on State highways. Pavement Markers when used should be placed on the through traffic side only.

DETAIL 38A - Channelizing Line



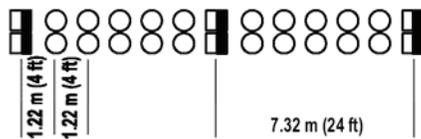
Typical channelizing line for use on Left-Turn or Right-Turn lanes on local streets and highways and freeway off-ramp terminals.

DETAIL 38B - Channelizing Line at Exit Ramps

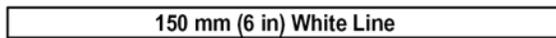


Typical channelizing line for use on Exit Ramps. Pavement Markers as shown may also be placed on the line.

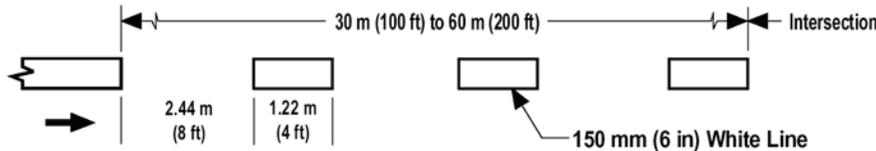
DETAIL 38C - Alternate to Detail 38 and 38B



DETAIL 39 - Bike Lane Line



DETAIL 39A - Bike Lane Intersection Line



DETAIL 40 - Lane Line Extension Through Intersections

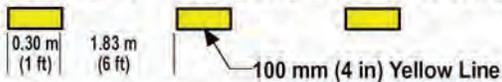


The Lane Line Extension Through Intersections line is used to extend the lane line through an intersection that might otherwise be confusing to the motorist.

DETAIL 40A - Alternate to Detail 40



DETAIL 41 - Centerline Extension Through Intersections



The Centerline Extension Through Intersections line is used to extend the centerline through an intersection that might otherwise be confusing to the motorist.

DETAIL 41A - Alternate to Detail 41



NOT TO SCALE

LEGEND

| | | |
|-------------|------------------------------------|---------------------------------------|
| White Line | Non-Retroreflective White Markers | Direction of Travel |
| Yellow Line | Non-Retroreflective Yellow Markers | One-Way Clear Retroreflective Markers |

CHAPTER 3B. PAVEMENT AND CURB MARKINGS

Section 3B.01 Yellow Centerline Pavement Markings and Warrants

Standard:

Centerline pavement markings, when used, shall be the pavement markings used to delineate the separation of traffic lanes that have opposite directions of travel on a roadway and shall be yellow.

Option:

Centerline pavement markings may be placed at a location that is not the geometric center of the roadway.

On roadways without continuous centerline pavement markings, short sections may be marked with centerline pavement markings to control the position of traffic at specific locations, such as around curves, over hills, on approaches to highway-railroad grade crossings, at highway-railroad grade crossings, and at bridges.

Standard:

The centerline markings on two-lane, two-way roadways shall be one of the following as shown in Figure 3B-1:

- A. Two-direction passing zone markings consisting of a normal broken yellow line where crossing the centerline markings for passing with care is permitted for traffic traveling in either direction;**
- B. One-direction no-passing zone markings consisting of a normal broken yellow line and a normal solid yellow line where crossing the centerline markings for passing with care is permitted for the traffic traveling adjacent to the broken line, but is prohibited for traffic traveling adjacent to the solid line; and**
- C. Two-direction no-passing zone markings consisting of two normal solid yellow lines where crossing the centerline markings for passing is prohibited for traffic traveling in either direction.**

The centerline markings on undivided two-way roadways with four or more lanes for moving motor vehicle traffic always available shall be the two-direction no-passing zone markings consisting of two normal solid yellow lines as shown in Figure 3B-2.

Guidance:

On two-way roadways with three through lanes for moving motor vehicle traffic, two lanes should be designated for traffic in one direction by using one- or two-direction no-passing zone markings as shown in Figure 3B-3.

Standard:

Centerline markings shall be placed on all paved urban arterials and collectors that have a traveled way of 6.1 m (20 ft) or more in width and an ADT of 6,000 vehicles per day or greater. Centerline markings shall also be placed on all paved two-way streets or highways that have three or more lanes for moving motor vehicle traffic.

Guidance:

Centerline markings should be placed on paved urban arterials and collectors that have a traveled way of 6.1 m (20 ft) or more in width and an ADT of 4,000 vehicles per day or greater. Centerline markings should also be placed on all rural arterials and collectors that have a traveled way of 5.5 m (18 ft) or more in width and an ADT of 3,000 vehicles per day or greater. Centerline markings should also be placed on other traveled ways where an engineering study indicates such a need.

Engineering judgment should be used in determining whether to place centerline markings on traveled ways that are less than 4.9 m (16 ft) wide because of the potential for traffic encroaching on the pavement edges, traffic being affected by parked vehicles, and traffic encroaching into the opposing traffic lane.

Option:

Centerline markings may be placed on other paved two-way traveled ways that are 4.9 m (16 ft) or more in width.

If a traffic count is not available, the ADTs described in this Section may be estimates that are based on engineering judgment.

Standard:

Centerline patterns shall be selected from those shown in Figures 3A-101(CA) and 3A-104(CA).

Raised retroreflective pavement markers shall be used to supplement the centerline markings on State highways, except in snow areas.

Support:

On horizontal curves with radii less than 1000 m (3280 ft) and without street lighting, Detail 22 instead of Detail 21 can be helpful in improving the delineation for centerline markings as it includes retroreflective raised pavement markers. Detail 22 can be applied in advance of the approach to the curve per Table 2C-4 and continued throughout the length of the curve.

Refer to CVC 21460 for Double Lines.

Refer to CVC 21460.5 for Two-Way Left-Turn Lanes.

Standard:

A left edge line shall consist of a solid 100 mm (4 in) wide yellow line, yellow reflective pavement markers or a combination of line and markers as shown in Figure 3A-105(CA).

Option:

Two normal solid yellow lines may be used as a left edge line on a divided roadway for more emphasis when motorists tend to use the shoulder for a through lane or where encroachments onto the shoulder occasionally occur.

Support:

Left edge line patterns for median islands are shown in Figure 3A-107(CA).

Section 3B.02 No-Passing Zone Pavement Markings and Warrants

Standard:

No-passing zones shall be marked by either the one direction no-passing zone pavement markings or the two-direction no-passing zone pavement markings described previously and shown in Figures 3B-1 and 3B-3.

When centerline markings are used, no-passing zone markings shall be used on two-way roadways at lane reduction transitions (see Section 3B.09) and on approaches to obstructions that must be passed on the right (see Section 3B.10).

Guidance:

~~Where the distance between successive no-passing zones is less than 120 m (400 ft), no-passing markings should connect the zones.~~

Standard:

If the gap between successive no-passing zones is less than the sight distance for the prevailing speed shown in Table 3B-1, the no-passing zone shall be continuous.

Where centerline markings are used, no-passing zone markings shall be used on approaches to highway-rail grade crossings in conformance with Section 8B.20.

Option:

In addition to pavement markings, no-passing zone signs (see Sections 2B.29, 2B.30, and 2C.35) may be used to emphasize the existence and extent of a no-passing zone.

Support:

Section 11-307 of the "Uniform Vehicle Code (UVC) Revised" contains further information regarding no-passing zones. The "UVC" can be obtained from the National Committee on Uniform Traffic Laws and Ordinances at the address shown on Page i.

Standard:

On two-way, two- or three-lane roadways where centerline markings are installed, no-passing zones shall be established at vertical and horizontal curves and other locations where an engineering study indicates that passing must be prohibited because of inadequate sight distances or other special conditions.

On three-lane roadways where the direction of travel in the center lane transitions from one direction to the other, a no-passing buffer zone shall be provided in the center lane as shown in Figure 3B-4. A lane transition shall be provided at each end of the buffer zone.

The buffer zone shall be a median island that is at least 15 m (50 ft) in length.

Guidance:

For three-lane roadways having a posted or statutory speed limit of 70 km/h (45 mph) or greater, the lane transition taper length should be computed by the formula $L = 0.62 WS$ for speeds in km/h ($L = WS$ for speeds in mph). For roadways where the posted or statutory speed limit is less than 70 km/h (45 mph), the formula $L = WS^2/155$ for speeds in km/h ($L = WS^2/60$ for speeds in mph) should be used to compute taper length. Under both formulas, L equals the taper length in meters (feet), W equals the width of the center lane or offset distance in meters (feet), and S equals the 85th-percentile speed or the posted or statutory speed limit, whichever is higher.

Standard:

The minimum lane transition taper length shall be 30 m (100 ft) in urban areas and 60 m (200 ft) in rural areas.

On roadways with centerline markings, no-passing zone markings shall be used at horizontal or vertical curves where the passing sight distance is less than the minimum necessary for reasonably safe passing at the 85th-percentile speed or the posted or statutory speed limit as shown in Table 3B-1. The passing sight distance on a vertical curve is the distance at which an object 1.07 m (3.5 ft) above the pavement surface can be seen from a point 1.07 m (3.5 ft) above the pavement (see Figure 3B-5). Similarly, the passing sight distance on a horizontal curve is the distance measured along the centerline (or right-hand lane line of a three-lane roadway) between two points 1.07 m (3.5 ft) above the pavement on a line tangent to the embankment or other obstruction that cuts off the view on the inside of the curve (see Figure 3B-5).

Support:

The beginning of a no-passing zone at point "a" in Figure 3B-5 is that point where the sight distance first becomes less than that specified in Table 3B-1. The end of the no-passing zone at point "b" in Figure 3B-5 is that point at which the sight distance again becomes greater than the minimum specified.

Support:

Refer to CVC 21750 through 21759 for overtaking and passing.

Refer to CVC 21460 for Double Lines.

CVC 21752 restricts passing (driving on left side of a two-way roadway) when approaching within 30 m (100 ft) of or when traversing any intersection or railroad grade crossing. CVC 21752 also restricts passing (driving on left side of a two-way roadway) when the view is obstructed upon approaching within 30 m (100 ft) of any bridge, viaduct, or tunnel. The patterns and policy for intersection markings are shown in Figure 3A-109(CA).

Standard:

No-passing zone patterns shall be selected from those shown in Figures 3A-103(CA) and 3A-104(CA).

Guidance:

The no-passing zone markings at intersections, when used, should be between 30 m (100 ft) and 90 m (300 ft) in length at the approach to an intersection and placed in a pattern as shown in Figure 3A-109(CA).

Section 3B.03 Other Yellow Longitudinal Pavement Markings

Standard:

If reversible lanes are used, the lane line pavement markings on each side of reversible lanes shall consist of a normal double broken yellow line to delineate the edge of a lane in which the direction of travel is reversed from time to time, such that each of these markings serve as the centerline markings of the roadway during some period (see Figure 3B-6).

Signs (see Section 2B.25), lane-use control signals (see Chapter 4J), or both shall be used to supplement reversible lane pavement markings.

If a two-way left-turn lane that is never operated as a reversible lane is used, the lane line pavement markings on each side of the two-way left-turn lane shall consist of a normal broken yellow line and a normal solid yellow line to delineate the edges of a lane that can be used by traffic in either direction as part of a left-turn maneuver. These markings shall be placed with the broken line toward the two-way left-turn lane and the solid line toward the adjacent traffic lane as shown in Figure 3B-7.

Option:

Pavement marking arrows may be used in conjunction with the two-way left-turn lane markings as shown in Figure 3B-7.

Guidance:

Signs ~~should~~ **may** be used in conjunction with the two-way left turn markings (see Section 2B.24).

Standard:

If a continuous median island formed by pavement markings separating travel in opposite directions is used, two sets of double solid yellow lines shall be used to form the island as shown in Figures 3B-2 and 3B-4. Other markings in the median island area shall also be yellow, except crosswalk markings which shall be white (see Section 3B.17).

On State highways, reversible lanes shall be separated by physical barriers or delineators.

Support:

A two-way left-turn lane is a lane reserved in the center of a highway for exclusive use of left or U-turning vehicles. Refer to CVC 21460.5. It is normally used where there are many points of access.

Standard:

The two-way left-turn lane markings shall be selected from those shown in Figure 3A-108(CA).

Option:

Optional treatments at signalized, major and minor intersections as shown in Figure 3B-7(CA) may be used.

Two-way opposing pavement arrows may be used as shown in Figure 3B-7(CA). The arrows may be supplemented by Two-Way Left Turn Lane (R67(CA)) sign at new installations and problem locations.

Guidance:

A gap in the markings should be made at all intersections.

Support:

For left turn channelization, see Figure 3B-101(CA) and Department of Transportation's Highway Design Manual, Section 405.2. See Section 1A.11 for information regarding this publication.

Channelized left-turn lanes in combination with continuous raised-curb medians are used instead of two-way left-turn lanes (TWLTL) if one or more of the following conditions exist:

- Average daily traffic volumes exceed 20,000 vehicles per day
- For remediation where there is a demonstrated crash problem,
- Wherever a need is demonstrated through engineering study.

Section 3B.04 White Lane Line Pavement Markings and Warrants

Standard:

When used, lane line pavement markings delineating the separation of traffic lanes that have the same direction of travel shall be white.

Support:

Examples of lane line markings are shown in Figures 3B-2, 3B-3, 3B-7 through 3B-13, 3B-22, ~~3B-24~~ 3B-23(CA), and 3B-26.

Standard:

Where crossing the lane line markings with care is permitted, the lane line markings shall consist of a normal broken white line.

Where crossing the lane line markings is discouraged, the lane line markings shall consist of a normal solid white line.

Option:

Solid white lane line markings may be used to separate through traffic lanes from auxiliary lanes, such as uphill truck lanes, left- or right-turn lanes, and preferential lanes. They may also be used to separate traffic lanes approaching an intersection.

Wide solid lane line markings may be used for greater emphasis.

Standard:

Where crossing the lane line markings is prohibited, the lane line markings shall consist of two normal solid white lines.

Lane line markings shall be used on all freeways and Interstate highways.

Guidance:

Lane line markings should be used on all roadways with two or more adjacent traffic lanes that have the same direction of travel. Lane line markings should also be used at congested locations where the roadway will accommodate more traffic lanes with lane line markings than without the markings.

Standard:

Lane line patterns shall be selected from those shown in Figure 3A-102(CA). Detail 9 or 10 (65 km/h (40 mph) or less) or Detail 12 or 13 (70 km/h (45 mph) or more) shall be used on State freeways, expressways, freeway ramps, freeway to freeway connectors and collector roads, except when used in snow areas, the raised pavement markers will be recessed.

Section 3B.05 Other White Longitudinal Pavement Markings

Standard:

A channelizing line shall be a wide or double solid white line.

Option:

Channelizing lines may be used to form channelizing islands where traffic traveling in the same direction is permitted on both sides of the island.

Standard:

Other pavement markings in the channelizing island area shall be white.

Support:

Examples of channelizing line applications are shown in Figures ~~3B-8~~ 3B-8(CA), ~~3B-9~~ 3B-9(CA), and 3B-13.

Channelizing lines at exit ramps as shown in Figure ~~3B-8~~ 3B-8(CA) define the neutral area, direct exiting traffic at the proper angle for smooth divergence from the main lanes into the ramp, and reduce the probability of colliding with objects adjacent to the roadway.

Channelizing lines at entrance ramps as shown in Figure ~~3B-9~~ 3B-9(CA) promote reasonably safe and efficient merging with the through traffic.

Standard:

For exit ramps, channelizing lines shall be placed along the sides of the neutral area adjacent to the through traffic lane and the ramp lane. With a parallel deceleration lane, a 200 mm (8 in) wide dotted white lane drop line shall be extended from the beginning of the channelizing line upstream of the entire for a distance of one-half the length of the full-width deceleration lane as shown in Figure ~~3B-8~~ 3B-8(CA).

Option:

White chevron markings may be placed in the neutral area for special emphasis as shown in Figure ~~3B-8~~ 3B-8(CA).

Guidance:

For entrance ramps, a channelizing line should be placed along the side of the neutral area adjacent to the ramp lane.

For entrance ramps with a parallel acceleration lane, a lane line should be extended from the end of the channelizing line for a distance of one-half the entire length of the full-width acceleration lane as shown in Figure ~~3B-9~~ 3B-9(CA).

Option:

For entrance ramps with a tapered acceleration lane, lane line markings may be placed to extend the channelizing line, but not beyond a point where the tapered lane meets the near side of the through traffic lane as shown in Figure ~~3B-9~~ 3B-9(CA).

Standard:

Lane drop markings as shown in Figure ~~3B-10~~ 3B-10(CA) may shall be used in advance of lane drops at exit ramps to distinguish a lane drop from a normal exit ramp or from an auxiliary lane.

Option:

The lane drop marking may consist of a wide, white dotted line with line segments 0.9 m (3 ft) in length separated by 2.7 m (9 ft) gaps.

Guidance:

If used, lane drop markings should begin 800 m (0.5 mi) in advance of the theoretical gore point.

If the dropped lane is an auxiliary lane 0.8 km (1/2 mi) or less in length, the lane drop line should extend throughout the entire length.

Option:

Where lane changes might cause conflicts, a wide solid white channelizing line may extend upstream from the theoretical gore point.

Standard:

The lane drop line pattern shall be as shown in Figure 3A-111(CA).

Support:

See Figures 3A-111(CA), 3B-8(CA), 3B-9(CA), 3B-10(CA), 3B-12(CA) and 3B-107(CA) for further details of markings and signing.

Option:

A 200 mm (8 in) wide single solid white line preceded by a 200 mm (8 in) wide dotted white line may be placed in advance of an intersection where the outside lane is dropped at the intersection, and as a result, creates a mandatory turn lane.

Standard:

If used, diagonal lines shall be the same color as the edge line.

Section 3B.06 Edge Line Pavement Markings

Standard:

If used, edge line pavement markings shall delineate the right or left edges of a roadway.

Except for dotted edge line extensions (see Section 3B.08), edge line markings shall not be continued through intersections or major driveways.

If used on the roadways of divided highways or one-way streets, or on any ramp in the direction of travel, left edge line pavement markings shall consist of a normal solid yellow line to delineate the left edge of a roadway or to indicate driving or passing restrictions left of these markings.

If used, the right edge line pavement markings shall consist of a normal solid white line to delineate the right edge of the roadway.

Guidance:

Edge line markings should not be broken for minor driveways.

Support:

Edge line markings have unique value as visual references to guide road users during adverse weather and visibility conditions.

Option:

Wide solid edge line markings may be used for greater emphasis.

Standard:

A right edge line shall consist of a solid 100 mm (4 in) wide white line.

Guidance:

The edge line should be placed 50 mm (2 in) in from the edge of traveled way, approximately 3.6 m (12 ft) from the lane line or centerline on highway mainlines, ramps, and connectors. See Figure 3A-106(CA).

Generally, the solid edge line should be dropped at the beginning of intersection flares.

Option:

In heavy fog areas, or locations where additional guidance would be beneficial, a dotted 100 mm (4 in) wide white right edge line may be continued across an intersection.

Support:

Edge line is not used at turnouts. See Figure 3B-108(CA).

Standard:

Exit and entrance ramps, including freeway connectors, shall be marked with a yellow edge line supplemented with yellow reflective pavement markers on the left and a white edge line on the right. See Figure 3A-105(CA).

Section 3B.07 Warrants for Use of Edge Lines

Standard:

Edge line markings shall be placed on paved streets or highways with the following characteristics:

- A. Freeways;**
- B. Expressways; and**
- C. Rural arterials with a traveled way of 6.1 m (20 ft) or more in width and an ADT of 6,000 vehicles per day or greater.**

Guidance:

Edge line markings should be placed on paved streets or highways with the following characteristics:

- A. Rural arterials and collectors with a traveled way of 6.1 m (20 ft) or more in width and an ADT of 3,000 vehicles per day or greater.
- B. At other paved streets and highways where an engineering study indicates a need for edge line markings.

Edge line markings should not be placed where an engineering study or engineering judgment indicates that providing them is likely to decrease safety.

Option:

Edge line markings may be placed on streets and highways with or without centerline markings.

Edge line markings may be excluded, based on engineering judgment, for reasons such as if the traveled way edges are delineated by curbs, parking, bicycle lanes, or other markings.

Edge line markings may be used where edge delineation is desirable to minimize unnecessary driving on paved shoulders or on refuge areas that have lesser structural pavement strength than the adjacent roadway.

Standard:

Edge lines shall be used on all State highways, except urban type streets with curbs and parking provisions.

Option:

The Two-Way Traffic (W6-3) sign may be used in conjunction with edge lines at locations where motorists could perceive that they are on a one-way roadway when, in fact, they are on a two lane, two-way highway. See Section 2C.34 for W6-3 sign.

Section 3B.08 Extensions Through Intersections or Interchanges

Standard:

Pavement markings extended into or continued through an intersection or interchange area shall be the same color and at least the same width as the line markings they extend (see Figure 3B-11).

Option:

A normal line may be used to extend a wide line through an intersection.

Guidance:

Where highway design or reduced visibility conditions make it desirable to provide control or to guide vehicles through an intersection or interchange, such as at offset, skewed, complex, or multilegged intersections, on curved roadways, or where multiple turn lanes are used, dotted line markings should be used to extend longitudinal line markings through an intersection or interchange area.

Option:

Dotted edge line extensions may be placed through intersections or major driveways.

Guidance:

Where greater restriction is required, solid lane lines or channelizing lines should be extended into or continued through intersections or major driveways. However, edge lines should not be extended into or continued through intersections or major driveways as solid lines.

A single line of equal width to one of the lines of the double line should be used to extend a double line through an intersection.

To the extent possible, pavement marking extensions through intersections should be designed in a manner that minimizes potential confusion for drivers in adjacent or opposing lanes.

Support:

See Figure 3A-112(CA), Detail 40 and 40A for lane line extensions.

Section 3B.09 Lane Reduction Transition Markings

Standard:

Where pavement markings are used, lane reduction transition markings shall be used to guide traffic through transition areas where the number of through lanes is reduced, as shown in Figure 3B-12-3B-12(CA). On two-way roadways, no-passing zone markings shall be used to prohibit passing in the direction of the convergence, and shall continue through the transition area.

Guidance:

For roadways having a posted or statutory speed limit of 70 km/h (45 mph) or greater, the transition taper length for a lane reduction should be computed by the formula $L = 0.62 WS$ for speeds in km/h ($L = WS$ for speeds in mph). For roadways where the posted or statutory speed limit is less than 70 km/h (45 mph), the formula $L = WS^2/155$ for speeds in km/h ($L = WS^2/60$ for speeds in mph) should be used to compute taper length. Under both formulas, L equals the taper length in meters (feet), W equals the width of the offset distance in meters (feet), and S equals the 85th-percentile speed or the posted or statutory speed limit, whichever is higher.

Where observed speeds exceed posted or statutory speed limits, longer tapers should be used.

Option:

On new construction, where no posted or statutory speed limit is established, the design speed may be used in the transition taper length formula.

Guidance:

Lane line markings should be discontinued one-quarter of the distance between the Lane Ends sign (see Section 2C.33) and the point where the transition taper begins.

Edge line markings should be installed from the location of the warning sign to beyond the beginning of the narrower roadway.

Support:

Pavement markings at lane reduction transitions supplement the standard signs.

Typical lane reduction transitions (four lane to two lane) and transitions from two lanes to four lanes are shown in Figure 3B-12 (CA).

Section 3B.10 Approach Markings for Obstructions

Standard:

Pavement markings shall be used to guide traffic away from fixed obstructions within a paved roadway. Approach markings for bridge supports, refuge islands, median islands, and raised channelization islands shall consist of a tapered line or lines extending from the centerline or the lane line to a point 0.3 to 0.6 m (1 to 2 ft) to the right side, or to both sides, of the approach end of the obstruction (see Figure 3B-13).

Guidance:

For roadways having a posted or statutory speed limit of 70 km/h (45 mph) or greater, the taper length of the tapered line markings should be computed by the formula $L = 0.62 WS$ for speeds in km/h ($L = WS$ for speeds in mph). For roadways where the posted or statutory speed limit is less than 70 km/h (45 mph), the formula $L = WS^2/155$ for speeds in km/h ($L = WS^2/60$ for speeds in mph) should be used to compute taper length. Under both formulas, L equals the taper length in meters (feet), W equals the width of the offset distance in meters (feet), and S equals the 85th-percentile speed or the posted or statutory speed limit, whichever is higher.

Standard:

The minimum taper length shall be 30 m (100 ft) in urban areas and 60 m (200 ft) in rural areas.

Support:

Examples of approach markings for obstructions in the roadway are shown in Figure 3B-13.

Option:

Where observed speeds exceed posted or statutory speed limits, longer tapers may be used.

Standard:

If traffic is required to pass only to the right of the obstruction, the markings shall consist of a two-direction no-passing zone marking at least twice the length of the diagonal portion as determined by the appropriate taper formula (see Figure 3B-13).

Option:

If traffic is required to pass only to the right of the obstruction, yellow diagonal approach markings may be placed in the neutral area between the no-passing zone markings as shown in Figure 3B-13. Other markings, such as yellow delineators, raised pavement markers, and white crosswalk pavement markings, may also be placed in the neutral area.

Standard:

If traffic can pass either to the right or left of the obstruction, the markings shall consist of two channelizing lines diverging from the lane line, one to each side of the obstruction. In advance of the point of divergence, a solid wide white line or solid double normal white line shall be extended in place of the broken lane line for a distance equal to the length of the diverging lines (see Figure 3B-13).

Option:

If traffic can pass either to the right or left of the obstruction, additional white markings may be placed in the neutral area between the channelizing lines as shown in Figure 3B-13.

Section 3B.11 Raised Pavement Markers

Standard:

A raised pavement marker shall be a device with a height of at least 10 mm (0.4 in) mounted on or in a road surface that is intended to be used as a positioning guide or to supplement or substitute for pavement markings or to mark the position of a fire hydrant.

The color of raised pavement markers under both daylight and nighttime conditions shall conform to the color of the marking for which they serve as a positioning guide, or for which they supplement or substitute.

Option:

Blue raised pavement markers may be used to mark the positions of fire hydrants.

Support:

Retroreflective and internally illuminated raised pavement markers are available in monodirectional and bidirectional configurations. The bidirectional marker is capable of displaying the applicable color for each direction of travel.

Guidance:

Nonretroreflective raised pavement markers should not be used alone, without supplemental retroreflective or internally illuminated markers, as a substitute for other types of pavement markings.

Directional configurations should be used to maximize correct information and to minimize confusing information provided to the road user. Directional configurations also should be used to avoid confusion resulting from visibility of markers that do not apply to the road user.

The spacing of raised pavement markers used to supplement or substitute for other types of longitudinal markings should correspond with the pattern of broken lines for which the markers supplement or substitute.

Standard:

~~**The value of N for the spacing of raised pavement markers for a broken or dotted line shall equal the length of one line segment plus one gap. The value of N referenced for solid lines shall equal the N for the broken or dotted lines that might be adjacent to or might extend the solid lines (see Sections 3B.13 and 3B.14).**~~

The widths and patterns of raised pavement markers shall conform to the details shown in Figures 3A-101(CA) through 3A-112(CA). See Section 3A.05.

Support:

Figures 9-20 through 9-22 in the "Traffic Control Devices Handbook" (see Section 1A.11) contain additional information regarding the spacing of raised pavement markers on longitudinal markings.

Support:

Raised pavement markers are not normally placed where snow plows would damage the markers and require an unusual amount of replacement.

Guidance:

When used in these areas, they should be recessed, as shown in Department of Transportation's Standard Plan A20-D. See Section 1A.11 for information regarding this publication.

Advance Markers

Option:

Advance Markers at exit ramps may be used to help motorists locate exit ramps in heavy fog areas.

Support:

The Advance Markers consist of a 3-2-1 countdown pattern of one-way clear reflective pavement markers. The pattern consists of three markers placed on the right shoulder 640 m (2100 ft) in advance of the neutral area (gore), two markers at 425 m (1400 ft) and one marker at 215 m (700 ft). The markers are placed on a line perpendicular to the lane line at 0.3 m (1 ft) spacing beginning 50 mm (2 in) off the edge of traveled way.

Location Markers for Fire Hydrants

Option:

Blue raised reflective pavement markers, may be placed on a highway, street, or road, to mark fire hydrant and/or water supply locations.

Standard:

The blue raised reflective pavement markers shall not be used for any other purpose.

Local agencies shall not place blue reflective pavement markers on a State highway unless they first obtain an encroachment permit from the Department of Transportation. The agency responsible for the placement shall also be responsible for the maintenance and replacement. See Section 13060, of the Health and Safety Code. See Section 1A.11 for information regarding this publication.

Guidance:

In general, the blue reflective pavement markers should be placed 150 mm (6 in) from the centerline stripe, or approximate center of the pavement where there is no centerline stripe, on the side nearest the fire hydrant.

When placed on expressways, freeways and freeway ramps, they should be placed on the shoulder, 0.31 m (1 ft) to the right of the edge line, opposite the fire hydrant. Typical marker locations are shown on Figure 3B-102(CA).

Option:

Because fire hydrants adjacent to freeways may be out of the right-of-way and, in many locations, out of view from the freeway, some fire districts may want to install small supplemental signs (S9(CA) and S10(CA)) or markings to identify the hydrant number or distance to the hydrant. These installations are optional and at the discretion of the Department of Transportation's Districts.

Section 3B.12 Raised Pavement Markers as Vehicle Positioning Guides with Other Longitudinal Markings

Option:

Raised pavement markers may be used as positioning guides with longitudinal line markings without necessarily conveying information to the road user about passing or lane-use restrictions. In such applications, markers may be positioned between the two lines of a one-way or two-way no-passing zone marking or positioned in line with or immediately adjacent to single solid or broken centerline or lane line markings.

Support:

A typical spacing for such applications is $2N$, where N equals the length of one line segment plus one gap (see Section 3B.11).

Option:

Where it is desired to alert the road user to changes in the travel path, such as on sharp curves or on transitions that reduce the number of lanes or that shift traffic laterally, the spacing ~~may be reduced to N or less~~ shown in Details 16, 17, 19, 20, 22 or 23 may be used.

~~On freeways and expressways, a spacing of 3N may be used for relatively straight and level roadway segments where engineering judgment indicates that such spacing will provide adequate delineation under wet night conditions.~~

Standard:

The widths and patterns of raised pavement markers shall conform to the details shown in Figures 3A-101(CA) through 3A-112(CA). See Section 3A.05.

Section 3B.13 Raised Pavement Markers Supplementing Other Markings

Guidance:

The use of raised pavement markers for supplementing longitudinal line markings should conform to the following:

A. Lateral Positioning

1. When supplementing double line markings, pairs of raised pavement markers placed laterally in line with or immediately outside of the two lines should be used.
2. When supplementing wide line markings, pairs of raised pavement markers placed laterally adjacent to each other should be used.

B. Longitudinal Spacing

- ~~1. When supplementing solid line markings, raised pavement markers at a spacing no greater than N (see Section 3B.11) should be used, except when supplementing left edge line markings, a spacing of no greater than N/2 should be used. Raised markers should not supplement right edge line markings.~~
- ~~2. When supplementing broken line markings, a spacing no greater than 3N should be used. However, when supplementing broken line markings identifying reversible lanes, a spacing of no greater than N should be used.~~
3. When supplementing dotted line markings, a spacing appropriate for the application should be used.
4. When supplementing longitudinal line markings through at-grade intersections, one raised pavement marker for each short line segment should be used.
- ~~5. When supplementing edge line extensions through freeway interchanges, a spacing of no greater than N should be used.~~

Standard:

The widths and patterns of raised pavement markers shall conform to the details shown in Figures 3A-101(CA) through 3A-112(CA). See Section 3A.05.

Option:

Raised pavement markers also may be used to supplement other markings for channelizing islands or approaches to obstructions.

Section 3B.14 Raised Pavement Markers Substituting for Pavement Markings

Option:

Retroreflective or internally illuminated raised pavement markers, or nonretroreflective raised pavement markers supplemented by retroreflective or internally illuminated markers, may be substituted for markings of other types.

Guidance:

If used, the pattern and color of the raised pavement markers should simulate the pattern and color of the markings for which they substitute.

The normal spacing of raised pavement markers, when substituting for other markings, should be determined in terms of the standard length of the broken line segment.

Option:

The side of a raised pavement marker that is visible to traffic proceeding in the wrong direction may be red.

Standard:

If raised pavement markers are used to substitute for broken line markings, a group of three to five markers equally spaced at a distance no greater than N/8 (see Section 3B.11) shall be used. If N is other than 12 m (40 ft), the markers shall be equally spaced over the line segment length (at 1/2 points

~~for 3 markers, at 1/3 points for 4 markers, and at 1/4 points for 5 markers).~~ At least one retroreflective or internally illuminated marker per group shall be used or a retroreflective or internally illuminated marker shall be installed midway in each gap between successive groups of nonretroreflective markers.

~~When raised pavement markers substitute for solid lane line markings, the markers shall be equally spaced at no greater than N/4, with retroreflective or internally illuminated units at a spacing no greater than N/2.~~

The widths and patterns of raised pavement markers shall conform to the details shown in Figures 3A-101(CA) through 3A-112(CA). See Section 3A.05.

Guidance:

Raised pavement markers should not substitute for right edge line markings.

Standard:

~~When raised pavement markers substitute for dotted lines, they shall be spaced at no greater than N/4, with not less than one raised pavement marker per dotted line. At least one raised marker every N shall be retroreflective or internally illuminated.~~

Option:

When substituting for wide lines, raised pavement markers may be placed laterally adjacent to each other to simulate the width of the line.

Standard:

If used on State highways, internally-illuminated raised pavement markers shall be installed by an encroachment permit and include a maintenance agreement as a provision of the permit for the service life of the markers.

Section 3B.15 Transverse Markings

Standard:

Transverse markings, which include shoulder markings, word and symbol markings, stop lines, yield lines, crosswalk lines, speed measurement markings, speed hump markings, parking space markings, and others, shall be white unless otherwise specified herein.

Guidance:

Because of the low approach angle at which pavement markings are viewed, transverse lines should be proportioned to provide visibility equal to that of longitudinal lines.

Standard:

Pavement marking letters, numerals, and symbols shall be installed in accordance with the Pavement Markings chapter of the "Standard Highway Signs" book (see Section 1A.11).

Crosswalk markings near schools shall be yellow. Refer to CVC 21368 and Part 7.

Support:

Refer to Department of Transportation's Standard Plans for pavement marking letters, numerals and symbols. See Section 1A.11 for information regarding this publication

Section 3B.16 Stop and Yield Lines

Standard:

If used, stop lines shall consist of solid white lines extending across approach lanes to indicate the point at which the stop is intended or required to be made.

If used, yield lines (see Figure ~~3B-14~~ 3B-14(CA)) shall consist of a row of solid white isosceles triangles pointing toward approaching vehicles extending across approach lanes to indicate the point at which the yield is intended or required to be made.

Guidance:

Stop lines should be 300 to 600 mm (12 to 24 in) wide.

Stop lines should be used to indicate the point behind which vehicles are required to stop, in compliance with a STOP (R1-1) sign, traffic control signal, or some other traffic control device, except YIELD signs.

The individual triangles comprising the yield line should have a base of 300 to 600 mm (12 to 24 in) wide and a height equal to 1.5 times the base. The space between the triangles should be 75 to 300 mm (3 to 12 in).

Option:

Yield lines may be used to indicate the point behind which vehicles are required to yield in compliance with a YIELD (R1-2) sign or a Yield Here to Pedestrians (R1-5 or R1-5a) sign.

Guidance:

If used, stop and yield lines should be placed a minimum of 1.2 m (4 ft) in advance of the nearest crosswalk line at controlled intersections, except for yield lines at roundabout intersections as provided for in Section 3B.24 and at midblock crosswalks. In the absence of a marked crosswalk, the stop line or yield line should be placed at the desired stopping or yielding point, but should be placed no more than 9 m (30 ft) nor less than 1.2 m (4 ft) from the nearest edge of the intersecting traveled way. Stop lines should be placed to allow sufficient sight distance to all other approaches to an intersection.

If used at an unsignalized midblock crosswalk, yield lines should be placed adjacent to the Yield Here to Pedestrians sign located 6.1 to 15 m (20 to 50 ft) in advance of the nearest crosswalk line, and parking should be prohibited in the area between the yield line and the crosswalk (see Figure 3B-15).

Stop lines at midblock signalized locations should be placed at least 12 m (40 ft) in advance of the nearest signal indication (see Section 4D.15).

Support:

Drivers who yield too close to crosswalks on multi-lane approaches place pedestrians at risk by blocking other drivers' views of pedestrians.

Support:

As defined in CVC 377, a "limit line" is a solid white line not less than 300 mm (12 in) nor more than 600 mm (24 in) wide, extending across a roadway or any portion thereof to indicate the point at which traffic is required to stop in compliance with legal requirements.

Standard:

For all purposes, limit line(s) as defined per CVC 377 shall mean stop line(s).

A limit line shall be placed in conjunction with STOP (R1-1) signs on paved approaches, except where marked crosswalk exists.

Guidance:

If a sidewalk exists, the limit line should be placed in advance of an unmarked crosswalk area.

Option:

A limit line may be placed in advance of a crosswalk where vehicles are required to stop, in compliance with a STOP (R1-1) sign, traffic control signal or some other traffic control device.

Support:

If a marked crosswalk is in place, it would normally function as a limit line.

Typical limit line markings are shown in Figure 3B-103(CA).

Standard:

The individual triangles comprising the yield line shall have a base of 0.6 m (2 ft) wide and a height of 0.9 m (3 ft). The space between the triangles shall be 0.3 m (1 ft).

Support:

Figure 3B-14(CA) shows typical yield line layout for streets and highways.

Section 3B.17 Crosswalk Markings

Support:

Crosswalk markings provide guidance for pedestrians who are crossing roadways by defining and delineating paths on approaches to and within signalized intersections, and on approaches to other intersections where traffic stops.

Crosswalk markings also serve to alert road users of a pedestrian crossing point across roadways not controlled by highway traffic signals or STOP signs.

At nonintersection locations, crosswalk markings legally establish the crosswalk.

Standard:

When crosswalk lines are used, they shall consist of solid white lines that mark the crosswalk. They shall be not less than ~~150 mm (6 in)~~ 300 mm (12 in) nor greater than 600 mm (24 in) in width.

Guidance:

If transverse lines are used to mark a crosswalk, the gap between the lines should not be less than 1.8 m (6 ft). If diagonal or longitudinal lines are used without transverse lines to mark a crosswalk, the crosswalk should be not less than 1.8 m (6 ft) wide.

Crosswalk lines, if used on both sides of the crosswalk, should extend across the full width of pavement or to the edge of the intersecting crosswalk to discourage diagonal walking between crosswalks (see Figures 3B-15 and 3B-16).

Crosswalks should be marked at all intersections where there is substantial conflict between vehicular and pedestrian movements.

Marked crosswalks also should be provided at other appropriate points of pedestrian concentration, such as at loading islands, midblock pedestrian crossings, or where pedestrians could not otherwise recognize the proper place to cross.

Crosswalk lines should not be used indiscriminately. An engineering study should be performed before they are installed at locations away from highway traffic signals or STOP signs.

Because nonintersection pedestrian crossings are generally unexpected by the road user, warning signs (see Section 2C.41) should be installed and adequate visibility should be provided by parking prohibitions.

Support:

Section 3B.16 contains information regarding placement of stop line markings near crosswalk markings.

Option:

For added visibility, the area of the crosswalk may be marked with white diagonal lines at a 45-degree angle to the line of the crosswalk or with white longitudinal lines parallel to traffic flow as shown in Figure 3B-16.

When diagonal or longitudinal lines are used to mark a crosswalk, the transverse crosswalk lines may be omitted. This type of marking may be used at locations where substantial numbers of pedestrians cross without any other traffic control device, at locations where physical conditions are such that added visibility of the crosswalk is desired, or at places where a pedestrian crosswalk might not be expected.

Guidance:

If used, the diagonal or longitudinal lines should be 300 to 600 mm (12 to 24 in) wide and spaced 300 to 1500 mm (12 to 60 in) apart. The marking design should avoid the wheel paths, and the spacing should not exceed 2.5 times the line width.

Option:

When an exclusive pedestrian phase that permits diagonal crossing is provided at a traffic control signal, a marking as shown in Figure 3B-17 may be used for the crosswalk.

Standard:

Crosswalk markings near schools shall be yellow as provided in CVC 21368. See Part 7.

Option:

Pedestrian crosswalk markings may be placed at intersections, representing extensions of the sidewalk lines, or on any portion of the roadway distinctly indicated for pedestrian crossing. Refer to CVC 275.

Guidance:

In general, crosswalks should not be marked at intersections unless they are intended to channelize pedestrians. Emphasis is placed on the use of marked crosswalks as a channelization device.

The following factors may be considered in determining whether a marked crosswalk should be used:

- Vehicular approach speeds from both directions.
- Vehicular volume and density.
- Vehicular turning movements.
- Pedestrian volumes.
- Roadway width.
- Day and night visibility by both pedestrians and motorists.

- Channelization is desirable to clarify pedestrian routes for sighted or sight impaired pedestrians.
- Discouragement of pedestrian use of undesirable routes.
- Consistency with markings at adjacent intersections or within the same intersection.

Option:

Crosswalk markings may be established between intersections (mid-block) in accordance with CVC 21106(a).

Guidance:

Mid-block pedestrian crossings are generally unexpected by the motorist and should be discouraged unless, in the opinion of the engineer, there is strong justification in favor of such installation. Particular attention should be given to roadways with two or more traffic lanes in one direction as a pedestrian may be hidden from view by a vehicle yielding the right-of-way to a pedestrian.

Option:

When diagonal or longitudinal lines are used to mark a crosswalk, the transverse crosswalk lines may be omitted.

Standard:

However, when the factor that determined the need to mark a crosswalk is the clarification of pedestrian routes for sight-impaired pedestrians, the transverse crosswalk lines shall be marked.

Option:

At controlled approaches, limit lines (stop lines) help to define pedestrian paths and are therefore a factor the engineer may consider in deciding whether or not to mark the crosswalk.

Where it is desirable to remove a marked crosswalk, the removal may be accomplished by repaving or surface treatment.

Guidance:

A marked crosswalk should not be eliminated by allowing it to fade out or be worn away.

Support:

The worn or faded crosswalk retains its prominent appearance to the pedestrian at the curb, but is less visible to the approaching driver.

Standard:

Notification to the public shall be given at least 30 days prior to the scheduled removal of an existing marked crosswalk. The notice of proposed removal shall inform the public how to provide input related to the scheduled removal and shall be posted at the crosswalk identified for removal. Refer to CVC 21950.5

Option:

Signs may be installed at or adjacent to an intersection directing that pedestrians shall not cross in a crosswalk indicated at the intersection in accordance with CVC 21106(b).

White PED XING pavement markings may be placed in each approach lane to a marked crosswalk, except at intersections controlled by traffic signals or STOP or YIELD signs.

Section 3B.18 Parking Space Markings

Support:

Marking of parking space boundaries encourages more orderly and efficient use of parking spaces where parking turnover is substantial. Parking space markings tend to prevent encroachment into fire hydrant zones, bus stops, loading zones, approaches to intersections, curb ramps, and clearance spaces for islands and other zones where parking is restricted. Examples of parking space markings are shown in Figure ~~3B-18~~ 3B-18(CA).

Standard:

Parking space markings shall be white.

Option:

Blue lines may supplement white parking space markings of each parking space designated for use only by persons with disabilities.

Support:

Additional parking space markings for the purpose of designating spaces for use only by persons with disabilities are discussed in Section 3B.19 and illustrated in Figure ~~3B-19~~ 3B-19(CA).

Support:

Refer to CVC 22500 through 22522 for parking space markings.

Refer to Section 2B.39 for Parking Regulations.

Policy on Parking Restrictions

Option:

Local authorities may, by ordinance, provide for the establishment of parking meter zones and cause streets and highways to be marked with white lines designating parking spaces. Refer to CVC Section 22508.

Standard:

Where the proposed zones are on State highways, the ordinances shall be approved by the Department of Transportation.

Local authorities shall furnish a sketch or map showing the definite location of all parking meter stalls on State highways before departmental approval is given.

Support:

The District Directors have been delegated the authority to approve such ordinances.

The desirable dimensions of parking meter stalls are 2.4 m (8 ft) by 7.3 m (24 ft) with a minimum length of 6.1 m (20 ft).

Guidance:

At all intersections, one stall length on each side measured from the crosswalk or end of curb return should have parking prohibited. A clearance of 1.8 m (6 ft) measured from the curb return should be provided at alleys and driveways.

At signalized intersections parking should be prohibited for a minimum of two stall lengths on the near side and one stall length on the far side. See Figure 3B-18(CA).

Standard:

The departmental approval for the installation of the parking meters shall be covered by an encroachment permit.

Option:

Local authorities may by ordinance permit angle parking. Refer to CVC 22503.

Support:

Department of Transportation does not approve ordinances establishing angle parking on State highways.

Diagonal parking stalls are not permitted on State highways.

Section 3B.19 Pavement Word and Symbol Markings

Support:

Word and symbol markings on the pavement are used for the purpose of guiding, warning, or regulating traffic. Symbol messages are preferable to word messages. Examples of standard word and arrow pavement markings are shown in Figures ~~3B-20~~ 3B-20(CA) and ~~3B-21~~ 3B-21(CA).

Normally, pavement word and symbol markings supplement standard signing.

Standard:

Word and symbol markings shall be white, except as otherwise noted in this Section.

Guidance:

Letters and numerals should be ~~1.8 m (6 ft)~~ 2.44 m (8 ft) or more in height.

Word and symbol markings should not exceed three lines of information.

If a pavement marking word message consists of more than one line of information, it should read in the direction of travel. The first word of the message should be nearest to the road user.

Except for the two opposing arrows of a two-way left-turn lane marking (see Figure 3B-7), the longitudinal space between word or symbol message markings, including arrow markings, should be at least four times the height of the characters for low-speed roads, but not more than ten times the height of the characters under any conditions.

The number of different word and symbol markings used should be minimized to provide effective guidance and avoid misunderstanding.

Except as noted in the Option, pavement word and symbol markings should be no more than one lane in width.

Option:

~~The SCHOOL word marking may extend to the width of two approach lanes (see Section 7C.06).~~

Guidance:

When the SCHOOL word marking is extended to the width of two approach lanes, the characters should be 3 m (10 ft) or more in height (see Section 7C.06).

Standard:

If used, the SCHOOL pavement marking shown in Figure 3B-20(CA) and 7C-101(CA) shall be used and it shall be restricted to a single lane (See Section 7C.06).

Word and symbol markings near schools shall be yellow as provided in CVC 21368. See Part 7.

Option:

Pavement word and symbol markings ~~should~~ **may** be proportionally ~~scaled~~ **spaced** to fit within the width of the facility upon which they are applied.

Option:

On narrow, low-speed shared-use paths, the pavement words and symbols may be smaller than suggested, but to the relative scale.

Standard:

The International Symbol of Accessibility parking space markings ~~may~~ shall be placed in each parking space designated for use by persons with disabilities. A blue background with white border ~~may~~ shall supplement the wheelchair symbol as shown in Figure ~~3B-19~~ 3B-19(CA).

If used, new construction of accessible off-street parking spaces, and, loading and unloading areas shall include pavement marking details shown on Figure 3B-19 (CA), or as shown on the Department's Revised Standard Plan A90A. The loading and unloading area shall be marked by a border and hatched lines. The border shall be painted blue and the hatched lines shall be painted a suitable contrasting color to the parking space (blue or white paint is preferred).

If used, new construction of accessible on-street parking shall include a blue painted curb, as shown on the Department's Revised Standard Plan A90B. If on-street parking designated and designed for persons with disabilities includes a loading and unloading area, it shall be marked by a border and hatched lines. The border shall be painted blue and the hatched lines shall be painted a suitable contrasting color to the parking space (blue or white paint is preferred).

Loading and unloading areas shall include the words "NO PARKING" within the blue border and shall be painted in white letters no less than 0.3 m (12 in) high (See detail in Figure 3B-19 (CA)). Refer to California Code of Regulations Title 24, Section 1129B.4.

Standard:

Where through traffic lanes approaching an intersection become mandatory turn lanes, lane-use arrow markings (see Figure ~~3B-21~~ 3B-21(CA)) shall be used and shall be accompanied by standard signs.

Lane use, lane reduction, and wrong-way arrow markings shall be designed as shown in Figure ~~3B-21~~ 3B-21(CA).

Guidance:

Where through lanes become mandatory turn lanes, signs or markings should be repeated as necessary to prevent entrapment and to help the road user select the appropriate lane in advance of reaching a queue of waiting vehicles.

Option:

Lane-use arrow markings (see Figure ~~3B-21~~ 3B-21(CA)) may be used to convey either guidance or mandatory messages. The ONLY word marking (see Figure ~~3B-20~~ 3B-20(CA)) may be used to supplement lane-use arrow markings (see Figure 3B-22).

In situations where a lane reduction transition occurs, the lane reduction arrow markings shown in Figure ~~3B-21~~ 3B-21(CA) may be used.

Guidance:

Where crossroad channelization or ramp geometrics do not make wrong-way movements difficult, a lane-use arrow should be placed in each lane of an exit ramp near the crossroad terminal where it will be clearly visible to a potential wrong-way road user (see Figure ~~3B-23~~ 3B-23(CA)).

Option:

The wrong-way arrow markings shown in Figure ~~3B-21~~ 3B-21(CA) may be placed near the downstream terminus of a ramp as shown in Figures ~~3B-23~~ 3B-23(CA) and ~~3B-24~~ to indicate the correct direction of traffic flow and to discourage drivers from traveling in the wrong direction.

A yield-ahead triangle symbol or YIELD AHEAD word pavement marking may be used on approaches to intersections where the approaching traffic will encounter a YIELD sign at the intersection (see Figure 3B-25).

Support:

Lane-use arrow markings are often used to provide guidance in turn bays (see Figure 3B-22), where turns may or may not be mandatory, and in two-way left-turn lanes (see Figure 3B-7).

Arrows:

Standard:

Where a turning movement is mandatory, an arrow marking accompanied by a regulatory sign shall be used. However, when an additional clearly marked lane is provided for the approach to the turning movement, the sign is not required. Refer to CVC 22101.

Support:

Examples of entrance/exit ramp terminal signs and pavement markings are shown in Figure 3B-23(CA).

Guidance:

The Type V arrows and warning signs, as shown in Figure 3B-104(CA), should be used at locations where motorists could perceive that they are on a one-way roadway when, in fact, they are on a two lane, two-way highway. Following are some typical situations:

- Construction sites where a two-lane highway is being converted to a freeway or an expressway.
- Two-lane, two-way highways where ultimate freeway or expressway right-of-way has been purchased and grading for the full width has been completed.
- Two-lane, two-way highways following long sections of multi-lane freeway or expressway.

Exit Ramp Arrows:

Standard:

A minimum of two pavement arrows shall be placed on each freeway exit ramp lane.

A Type V arrow shall be the first arrow, on the ramp, in the direction of travel when exiting the freeway.

Where a mandatory movement is required, a Type I, II, III, IV, VII, or VIII arrow shall be placed with its point approximately 6.10 m (20 ft) preceding the limit line, crosswalk or "STOP" pavement legend. Where no mandatory movement is required, a Type V arrow shall be used at this location.

All other additional arrows, when used, shall be a minimum of 7.32 m (24 ft) in length.

All arrows shall be placed in the center of the lane and spaced approximately 30 m (100 ft) to 90 m (300 ft) apart.

Guidance:

The actual position and spacing should be determined in the field to provide the optimum visibility for traffic that may attempt to enter the exit ramp in the wrong direction.

Support:

See Figures 3B-21(CA) and 3B-23(CA).

Entrance Ramp Arrows:

Standard:

A minimum of one Type I arrow, not less than 5.49 m (18 ft) in length, shall be positioned in the center of each freeway entrance ramp lane so that it is clearly in view of a right-way driver.

Guidance:

The distance between arrows, when more than one per lane is needed, should be 30 m (100 ft) to 90 m (300 ft). The Type V arrow should not be used on entrance ramps.

Support:

See Figures 3B-21(CA) and 3B-23(CA).

Additional information on signing of ramp terminals is shown in Section 2E.50.

Turn Lane Arrows:

Standard:

One directional arrow, a minimum of 2.44 m (8 ft) in length, shall be placed in the center of each turning lane near the point of entrance.

Option:

High approach speeds may justify the use of a longer arrow. Two or more arrows may be placed in long turning lanes.

Support:

See Figures 3B-7(CA) and 3B-101(CA).

Support:

Refer to Section 2E.50 for Wrong-Way Traffic Control at Interchange Ramps.

Option:

Word and symbol markings may include, but are not limited to, the following. Other words or symbols may also be used under certain conditions.

A. Regulatory:

1. STOP
2. RIGHT (LEFT) TURN ONLY
3. 40 km/h (25 MPH)
4. Arrow Symbols

B. Warning:

1. STOP AHEAD
2. YIELD AHEAD
3. YIELD AHEAD Triangle Symbol
4. SCHOOL XING
5. SIGNAL AHEAD
6. PED XING
7. SCHOOL
8. R X R
9. BUMP
10. HUMP

C. Guide:

1. US 40
2. STATE 135
3. ROUTE 40

Standard:

Except at the ends of aisles in parking lots, the word STOP shall not be used on the pavement unless accompanied by a stop line (see Section 3B.16) and STOP sign (see Section 2B.04). At the ends of aisles in parking lots, the word STOP shall not be used on the pavement unless accompanied by a stop line.

The word STOP shall not be placed on the pavement in advance of a stop line, unless every vehicle is required to stop at all times.

The yield-ahead triangle symbol or YIELD AHEAD word pavement marking shall not be used unless a YIELD sign (see Section 2B.08) is in place at the intersection. The yield-ahead symbol marking shall be as shown in Figure 3B-25.

Guidance:

A STOP pavement marking should be placed on all but minor approaches to State highways not controlled by signals.

Option:

Pavement markings with appropriate figures may be used to supplement speed limit signs. See Section 2B.13.

Section 3B.20 Speed Measurement Markings

Support:

A speed measurement marking is a transverse marking placed on the roadway to assist the enforcement of speed regulations.

Standard:

Speed measurement markings, if used, shall be white, and shall not be greater than 600 mm (24 in) in width.

Option:

Speed measurement markings may extend 600 mm (24 in) on either side of the centerline or 600 mm (24 in) on either side of edge line markings at 400 m (0.25 mi) intervals over a 1.6 km (1 mi) length of roadway. When paved shoulders of sufficient width are available, the speed measurement markings may be placed entirely on these shoulders. Advisory signs may be used in conjunction with these markings (see ~~Figure 3B-10~~ 3B-105(CA)).

Support:

The California Highway Patrol patrols certain highways with both helicopters and fixed-wing aircraft. The purpose of the patrol is to monitor traffic, provide motorist assistance and initiate appropriate enforcement action.

In order to make the air patrol effective, the California Highway Patrol and Department of Transportation have agreed upon markings and signs as shown in Figure 3B-105(CA).

Option:

Speed measurement markings may be placed on the right shoulder in areas patrolled by aircraft as requested by the California Highway Patrol.

Standard:

Where there is an equation of more than 30 m (100 ft) in a 1.6 km (1 mi) posting, a white 'X' pavement marking shall be placed at each end of the section to indicate the markings are less than 1.6 km (1 mi) apart.

Guidance:

The SPEED ENFORCED BY AIRCRAFT (R48-2(CA)) sign should be used for both directions of travel and should be spaced at 40 km (25 mi) intervals.

Pavement marking should be placed on the shoulder in one direction only, except where the opposing roadway is widely separated.

Option:

In areas where identifying features are widely separated, white 0.91 m (3 ft) high post kilometer (mile) numbers may be placed at 8 km (5 mi) points where needed for aircraft reference.

Standard:

Markings shall not be on the traveled way.

Option:

If routes with narrow shoulders are requested for marking, the standard marking shape may be modified to provide an equivalent area without encroaching on the traveled way or the Alternate Marking System described.

Support:

The Alternate Marking System is a 200 mm (8 in) wide solid white longitudinal line, 6.1 m (20 ft) in length and in line with the right edge line. It is preceded and followed by a 6.1 m (20 ft) gap in the right edge line.

Section 3B.21 Curb Markings

Support:

Curb markings are most often used to indicate parking regulations or to delineate the curb.

Standard:

Signs shall be used with curb markings in those areas where curb markings are frequently obliterated by snow and ice accumulation unless the no parking zone is controlled by statute or local ordinance.

Where curbs are marked, the colors shall conform to the general principles of markings (see Section 3A.04).

Guidance:

Except as noted in the Option, when curb markings are used without signs to convey parking regulations, a legible word marking regarding the regulation (such as "No Parking" or "No Standing") should be placed on the curb.

Option:

Curb markings without word markings or signs may be used to convey a general prohibition by statute of parking within a specified distance of a STOP sign, driveway, fire hydrant, or crosswalk.

Guidance:

~~Retroreflective solid yellow markings should be placed on the noses of raised medians and curbs of islands that are located in the line of traffic flow where the curb serves to channel traffic to the right of the obstruction.~~

~~Retroreflective solid white markings should be used when traffic may pass on either side of the island.~~

Support:

Refer to Chapter 3C (Object Markers) for marking noses of raised medians and curbs of islands.

Option:

~~Local highway agencies may prescribe special colors for curb markings to supplement standard signs for parking regulation. Refer to CVC 21458 quoted later in this section.~~

Support:

Since yellow and white curb markings are frequently used for curb delineation and visibility, it is advisable to establish parking regulations through the installation of standard signs (see Sections 2B.39 through 2B.41).

Where the curbs of the islands become parallel to the direction of traffic flow, it is not necessary to mark the curbs unless an engineering study indicates the need for this type of delineation.

Curbs at openings in a continuous median island need not be marked unless an engineering study indicates the need for this type of marking.

Support:

Refer to Section 2B.39 for Parking Regulations.

In California, curb markings are not used for delineating traffic. They are mainly used for parking regulations.

Standard:

The color of curb markings shall conform to CVC 21458 quoted below:

- (a) Whenever local authorities enact local parking regulations and indicate them by the use of paint upon curbs, the following colors only shall be used, and the colors indicate as follows:
 - (1) Red indicates no stopping, standing, or parking, whether the vehicle is attended or unattended, except that a bus may stop in a red zone marked or sign posted as a bus loading zone.
 - (2) Yellow indicates stopping only for the purpose of loading or unloading passengers or freight for the time as may be specified by local ordinance.
 - (3) White indicates stopping for either of the following purposes:
 - (A) Loading or unloading of passengers for the time as may be specified by local ordinance.
 - (B) Depositing mail in an adjacent mailbox.
 - (4) Green indicates time limit parking specified by local ordinance.
 - (5) Blue indicates parking limited exclusively to the vehicles of disabled persons and disabled veterans.
- (b) Regulations adopted pursuant to subdivision (a) shall be effective on days and during hours or times as prescribed by local ordinances.

Parking regulations shall be covered by ordinance or order of the authority having jurisdiction over the street or highway.

Option:

Curb markings may supplement standard signs.

Prohibitions or restrictions enacted by local authorities under Sections 22506 or 22507 may be indicated by marking curbs as prescribed by CVC Section 21458.

Policy on Parking Restrictions

Support:

Loading Zones - Local authorities are authorized by Section 21112 of the CVC to license and regulate the location of stands on streets and highways for use of taxicabs and other public carriers for hire. Where such stands are located on State highways, and highway maintenance is not delegated to the local authority, the approval of the Department is required. The District Directors have been delegated authority to approve local ordinances establishing such stands.

Loading zone ordinances restricted for certain segments of traffic such as "hotel patrons only" will not be approved. Bus stand ordinances are generally approved.

Standard:

Whenever practicable, bus stands shall be located on the far side of the intersection.

Section 3B.22 Preferential Lane Word and Symbol Markings

Standard:

When a lane is assigned full or part time to a particular class or classes of vehicles, preferential lane markings shall be used.

Signs or signals shall be used with preferential lane word or symbol markings.

All preferential lane word and symbol markings shall be white.

All preferential lane word and symbol markings shall be positioned laterally in the center of the preferred-use lane.

Support:

Preferential lanes identify a wide variety of special uses, including, but not limited to, high-occupancy vehicle (HOV) lanes, bicycle lanes, bus only lanes, taxi only lanes, and light rail transit only.

Standard:

Where a preferential lane use is established, the preferential lane shall be marked with one or more of the following symbol or word markings for the preferential lane use specified:

- A. HOV lane—the preferential lane use marking for high-occupancy vehicle lanes shall consist of white lines formed in a diamond shape symbol or the word message HOV. The diamond shall be at least 0.75 m (2.5 ft) wide and 3.7 m (12 ft) in length. The lines shall be at least 150 mm (6 in) in width.**
- B. Bicycle lane—the preferential lane use marking for a bicycle lane shall consist of a bicycle symbol or the word marking BIKE LANE (see Chapter 9C and Figures 9C-1 and 9C-3 through 9C-6).**
- C. Bus only lane—the preferential lane use marking for a bus only lane shall consist of the word marking BUS ONLY.**
- D. Taxi only lane—the preferential lane use marking for a taxi only lane shall consist of the word marking TAXI ONLY.**
- E. Light rail transit lane—the preferential lane use marking for a light rail transit lane shall consist of the letter T.**
- F. Other preferential lane use markings shall be identified in accordance with Section 3B.23.**

If two or more preferential lane uses are permitted in a single lane, the symbol or word marking for each preferential lane use shall be installed.

Guidance:

Engineering judgment should determine the need for supplemental devices such as tubular markers, traffic cones, or flashing lights.

Support:

The spacing of the markings is an engineering judgment that is based on the prevailing speed, block lengths, distance from intersections, and other factors that affect clear communication to the road user. Markings spaced as close as 24 m (80 ft) apart might be appropriate on City streets, while markings spaced 300 m (1,000 ft) 150 m (500 ft) might be appropriate for freeways (Refer to HOV Guidelines) and 56 m (180 ft) for onramps (Refer to Ramp Meter Design Manual). See Section 1A.11 for information regarding these publications.

Option:

The vehicle occupancy requirements established for a high occupancy vehicle lane may be included in sequence after the diamond symbol or HOV word message.

Support:

For State highways, see Department of Transportation's High Occupancy Vehicle (HOV) Guidelines and Ramp Meter Design Manual. See Section 1A.11 for information regarding these publications.

High Occupancy Vehicle (HOV) lanes are lanes where usage is restricted to a class of vehicle occupancy. HOV lane assignments could be made on a full-time or part time basis. Freeway mainline HOV lanes can be operated as physically separated, buffer separated, reversible, contiguous, or as contra-flow facilities. HOV lanes can also be operated on county roads or city streets.

The HOV lane symbol (diamond shape) is shown in Figure 3B-106(CA).

Section 3B.23 Preferential Lane Longitudinal Markings for Motor Vehicles

Standard:

Preferential lane longitudinal markings for motor vehicles shall be marked with the appropriate word or symbol pavement markings in accordance with Section 3B.22.

Support:

Preferential lanes can take many forms depending on the level of usage and the design of the facility. They might be physically separated from the other travel lanes by a barrier, median, or painted neutral area, or they might be concurrent with other travel lanes and be separated only by longitudinal pavement markings. Further, physically separated preferential lanes might operate in the same direction or be reversible.

Option:

Preferential lanes may be operated either full-time (24 hours per day on all days), for extended periods of the day, or part-time (restricted usage during specific hours on specified days).

Standard:

The following four items are presented in tabular form in Table 3B-2 3B-2(CA):

- A. Physically separated, nonreversible preferential lane—the longitudinal pavement markings for preferential lanes that are physically separated from the other travel lanes by a barrier, median, or painted neutral area shall consist of a single normal solid yellow line at the left edge of the travel lane(s), a single normal solid white line at the right edge of the travel lane(s), and if there are two or more preferential lanes, the preferential travel lanes shall be separated with a normal broken white line (see Figure 3B-26a).**
- B. Physically separated, reversible preferential lane—the longitudinal pavement markings for reversible preferential lanes that are physically separated from the other travel lanes by a barrier, median, or painted neutral area shall consist of a single normal solid white line at both edges of the travel lane(s), and if there are two or more preferential lanes, the preferential travel lanes shall be separated with a normal broken white line (see Figure 3B-26a).**
- C. Concurrent flow (left side) preferential lane—the longitudinal pavement markings for a full-time or part-time preferential lane on the left side of the other traveled lanes shall consist of a single normal solid yellow line at the left edge of the preferential travel lane(s) and one of the following at the right edge of the preferential travel lane(s):**
 - ~~1. A double solid wide white line where crossing is prohibited (see Figure 3B-26b).~~
 2. A single solid wide white line where crossing is discouraged (see Figure 3B-26c).
 3. A single broken wide white line where crossing is permitted (see Figure 3B-26d) at ingress/egress segments for physically separated full-time preferential lanes.
 4. A single broken 100 mm (4 in) white line where crossing is permitted on preferential lanes that operate for only certain periods of the day. In these cases, markings shall conform to the purpose the lane serves a majority of the time.

If there are two or more preferential lanes, the preferential travel lanes shall be separated with a normal broken white line.

D. Concurrent flow (right side) preferential lane—the longitudinal pavement markings for a full-time or part-time preferential lane on the right of the other travel lanes shall consist of a single normal solid white line at the right edge of the preferential travel lane(s) if warranted and one of the following at the left edge of the preferential travel lane(s):

1. ~~A double solid wide white line where crossing is prohibited (see Figure 3B-26b).~~
2. ~~A single solid wide white line where crossing is discouraged (see Figure 3B-26c).~~
3. ~~A single broken wide white line where crossing is permitted (see Figure 3B-26d) at ingress/egress segments for physically separated full-time preferential lanes.~~
4. ~~A single dotted normal white line where crossing is permitted for any vehicle to perform a right turn maneuver (see Figure 3B-26e).~~
5. A single broken 100 mm (4 in) white line where crossing is permitted on preferential lanes that operate for only certain periods of the day. In these cases, markings shall conform to the purpose the lane serves a majority of the time.

If there are two or more preferential lanes, the preferential travel lanes shall be separated with a normal broken white line.

Guidance:

Option:

When concurrent flow preferential lanes and other travel lanes are separated by ~~more than 1.2 m (4 ft)~~ 3.6 m (12 ft) or more, chevron markings ~~should~~ may be placed in the neutral area.

Guidance:

If used, the chevron spacing should be ~~30 m (100 ft)~~ 60 m (200 ft) or greater.

Option:

~~For full-time or part-time concurrent flow preferential lanes, the spacing or skip pattern of the single broken wide white line may be reduced. The width of the single broken wide white line may be increased.~~

Support:

The striping pattern for the lane lines between the HOV lane and the adjacent normal flow lanes will vary depending on the condition. See Department of Transportation's High Occupancy Vehicle (HOV) Guidelines and Ramp Meter Design Manual for the appropriate HOV lane line striping patterns and markings. See Section 1A.11 for information regarding these publications.

Section 3B.24 Markings for Roundabout Intersections

Support:

Roundabout intersections are distinctive circular roadways that have the following three critical characteristics:

- A. A requirement to yield at entry which gives a vehicle on the circular roadway the right-of-way;
- B. A deflection of the approaching vehicle around the central island; and
- C. A flare or widening of the approach to allow for proper operation as needed.

Examples of markings for roundabout intersections are shown in Figures 3B-27 and 3B-28.

Option:

A yellow edge line may be placed around the inner (left) edge of the circular roadway.

Guidance:

A white line should be used on the outer (right) side of the circular roadway as follows: a solid line along the splitter island and a dotted line across the lane(s) entering the roundabout intersection.

Edge line extensions should not be placed across the exits from the circular roadway.

Where crosswalk markings are used, these markings should be located a minimum of 7.6 m (25 ft) upstream from the yield line, or, if none, from the dotted white line.

Option:

Lane lines may be used on the circular roadway if there is more than one lane.

A yield line (see Section 3B.16) may be used to indicate the point behind which vehicles are required to yield at the entrance to a roundabout intersection.

Standard:

Bicycle lane markings shall not be provided on the circular roadway of a roundabout intersection.

Section 3B.25 Markings for Other Circular Intersections

Support:

Other circular intersections include but are not limited to rotaries, traffic circles, and residential traffic calming designs.

Option:

The markings shown in Figures 3B-27 and 3B-28 may be used at other circular intersections when engineering judgment indicates that their presence will benefit drivers or pedestrians.

Section 3B.26 Speed Hump Markings

Standard:

If used, speed hump markings shall be a series of white markings placed on a speed hump to identify its location.

Option:

Speed humps, except those used for crosswalks, may be marked in accordance with Figure 3B-29. The markings shown in Figure 3B-30 may be used where the speed hump also functions as a crosswalk or speed table.

Support:

Per CVC 440, speed humps or bumps are not official traffic control devices.

Section 3B.27 Advance Speed Hump Markings

Standard:

If used, advance speed hump markings shall be a special white marking placed in advance of speed humps or other engineered vertical roadway deflections such as dips.

Option:

Advance speed hump markings may be used in advance of an engineered vertical roadway deflection where added visibility is desired or where such deflection is not expected (see Figure 3B-31).

Advance pavement wording such as BUMP or HUMP (see Section 3B.19) may be used on the approach to a speed hump either alone or in conjunction with advance speed hump markings. Appropriate advance warning signs may be used in conformance with Section 2C.24.

Guidance:

If used, advance speed hump markings should be installed in each approach lane.

Section 3B.101(CA) Diagonal and Chevron Markings

Guidance:

Diagonal and chevron markings should be used, when in the opinion of an engineer, it is necessary to add emphasis or to discourage vehicular travel upon a paint formed roadway feature such as an unusually wide shoulder area, a pedestrian refuge island, or a traffic divisional or channelization island.

Diagonal lines, when used, should be installed between an edge line and traffic island, or between pairs of double yellow lines.

Chevron markings, when used, should be installed between channelizing lines for traffic flows in the same direction.

Support:

The applicable channelizing lines for chevron markings are shown in Figure 3A-110(CA), Details 36, 36A and 36B and pairs of lines shown in Figure 3A-112(CA), Details 38 and 38A.

The diagonal lines or chevron markings are normally 300 mm (12 in) wide.

Standard:

Diagonal lines and chevrons shall be the same color as the line or lines to which they connect and shall point at a 45-degree forward angle.

Diagonal lines or chevrons, if used, shall be the same color as the edge line.

Option:

The spacing between these lines may vary from 0.3 m (1 ft) in a pedestrian crosswalk to 60 m (200 ft) for vehicular traffic.

Section 3B.102(CA) Passing Lanes

Standard:

When a passing lane is provided, a two-direction no passing marking (see Figure 3A-104(CA)) shall be used when the Average Daily Traffic (ADT) exceeds 3,000. See Figure 3B-107(CA).

Option:

Passing in both directions may be provided by alternating the direction of the middle lane at about 1.6 km (1 mi) intervals.

A one-direction no passing marking (see Figure 3A-103(CA)) with one or more YIELD TO UPHILL TRAFFIC (R55(CA)) signs may be used when the ADT is 3,000 or less.

Section 3B.103(CA) Truck Lanes

Standard:

When a climbing lane is provided on an upgrade and it is necessary to prohibit trucks from passing slower moving vehicles, a 200 mm (8 in) solid white line shall be used in place of the standard lane line stripe.

The TRUCKS RIGHT LANE ONLY (R53B(CA)) sign shall be placed at the beginning of the restriction and at approximately 0.4 km (1/4 mi) intervals. When the restriction is necessary only during certain hours, the Specific Hours/Days Plaque (R82A(CA)) shall be placed below the R53B(CA) sign.

The TRUCKS RIGHT LANE ONLY (R53B(CA)) sign shall be placed at the beginning of the restriction and at approximately 0.4 km (1/4 mi) intervals. When the restriction is necessary only during certain hours, the Specific Hours/Days Plaque (R82A(CA)) shall be placed below the R53B(CA) sign.

A TRUCK LANE (R4-6) sign shall be placed in advance of the truck lane. An END TRUCK LANE (R53A(CA)) sign shall be placed at the end of the restriction. See Figure 3B-12(CA) for signing and marking the end of an extra lane.

Section 3B.104(CA) Turn Lanes

Support:

Refer to CVC 21460.5 for Two-Way Left-Turn Lanes.

For details of two-way left-turn lanes, see Figure 3B-7(CA). For left turn channelization, see Figure 3B-101(CA) and Department of Transportation's Highway Design Manual, Section 405.2. See Section 1A.11 for information regarding this publication.

Standard:

Left-turn or right-turn lanes shall be separated from the through lanes by a single solid 200 mm (8 in) wide white line as shown in Figure 3A-112(CA).

Section 3B.105(CA) Turnouts

Guidance:

Paved turnouts should be marked with a 200 mm (8 in) wide single solid white line between the through lane and the turnout. The line should not extend through the entry and exit areas. See Figure 3B-108(CA) and Department of Transportation's Highway Design Manual, Section 204.5 (4). See Section 1A.11 for information regarding this publication.

Turnouts should be 60 m (200 ft) to 150 m (500 ft) in length including a short taper of 15 m (50 ft) at each end. Turnouts should not be longer than 150 m (500 ft).

The right edge line should be dropped throughout the length of the turnout.

Option:

Turnout length may be increased 30 m (100 ft) on down grades over 3%.

Section 3B.106(CA) Rumble Strips

Support:

Rumble strips are bands of raised material or indentations formed or ground into the traveled way, on the centerline or shoulders. Rumble strips call the motorist's attention to standard warning or regulatory devices or otherwise alert drivers by transmitting sound and/or vibration through the vehicle.

Option:

Rumble strips may be used in the traveled way on California's streets and highways if the traffic engineer considers their use as the optimal solution to the identified problem.

Rumble strips may be used upstream of stop-controlled or signalized intersections if one or more of the following conditions exist:

- Engineering judgment indicates a special need due to sight distance restriction.
- High approach speeds.
- History of Ran-Stop-Sign crashes.

Guidance:

The use of rumble strips on State highways should be reviewed by the Department of Transportation's District Traffic Engineer or their representative.

Option:

Rumble strips may be incorporated into rehabilitation projects to replace existing rumble strips without an extensive review.

Guidance:

Requests should include a description of location, reasons for use, the alternatives which were considered, collision history and a discussion of standard traffic control devices which have been or are in place.

Traveled Way Rumble Strips:

Support:

Rumble strips on the traveled way are 19 mm (0.75 in) or less in height if raised or 25 mm (1 in) or less in depth if rolled-in indentations, 8.5 mm (0.33 in) +/- 1.5 mm (0.06 in) if ground-in indentations and generally extend across the travel lanes.

A ground in rumble strip with the dimensions shown above has been field reviewed to confirm rideability for bicyclists & motorcyclists.

There are several significant disadvantages to the use of rumble strips across the travel lanes. These include:

- An abrupt rise in the roadway can present problems to bicyclists and motorcyclists. For this reason, there should be provisions made for cyclists to safely traverse through or around raised rumble strips.
- Nearby residents may be subjected to noise.

Typical locations where rumble strips on the traveled way have been used include:

- End of a freeway.
- In advance of toll booths.
- Within a construction zone in advance of the workers.
- In advance of a "T" Intersection where the motorist is not expecting to stop.

Shoulder Rumble Strips:

Support:

Shoulder rumble strips are 19 mm (0.75 in) or less in height if raised 25 mm (1 in) in depth for rolled-in indentations and 8.5 mm (0.33 in) +/- 1.5 mm (0.06 in) for ground-in indentations that extend along the highway shoulder. The maximum width of shoulder rumble strips is 300 mm (12 in) for both rolled-in and ground-in indentations.

Guidance:

Where bicycles are permitted, shoulder rumble strips should not be used unless approximately 1.5 m (5 ft) of clear shoulder width for bicycle use is available between the rumble strips and the outer edge of the shoulder.

Standard:

Ground-in rumble strip treatments that are greater than 8.5 mm (0.33 in) +/- 1.5 mm (0.06 in) depth shall not be installed on shoulders where bicyclists are allowed.

Option:

Research findings indicate that the use of rumble strips on shoulders of freeways in remote areas may reduce drift-off-road collisions. Drifting off the road is most likely to be a problem on freeways with few interchanges and long tangents. Rumble strips may be used on other roadway types as well to address drift off roadway collisions at locations where they are a concern. The rumble strips may consist of grooves rolled into the hot mix as part of a resurfacing project, ground-in indentation in Portland Concrete Cement or Asphalt Concrete in existing roadway shoulders, or the application of a raised and inverted profile thermoplastic.

Guidance:

When roadways in remote areas are to be resurfaced, consideration should be given to the drift-off-road problem and the use of rumble strips considered.

Option:

Table 3B-101(CA) may be used by the District Traffic Engineer as a guide to determine the appropriate rumble strip treatment for various shoulder types.

Centerline Rumble Strips:

Support:

Centerline rumble strips are currently being used experimentally at 2 and 3 lane locations in California and across the nation as a tool to address drift across the centerline collisions.

Option:

The District Traffic Engineer may consider the use of centerline rumble strips with other considerations as a means of addressing drift across the centerline collisions.

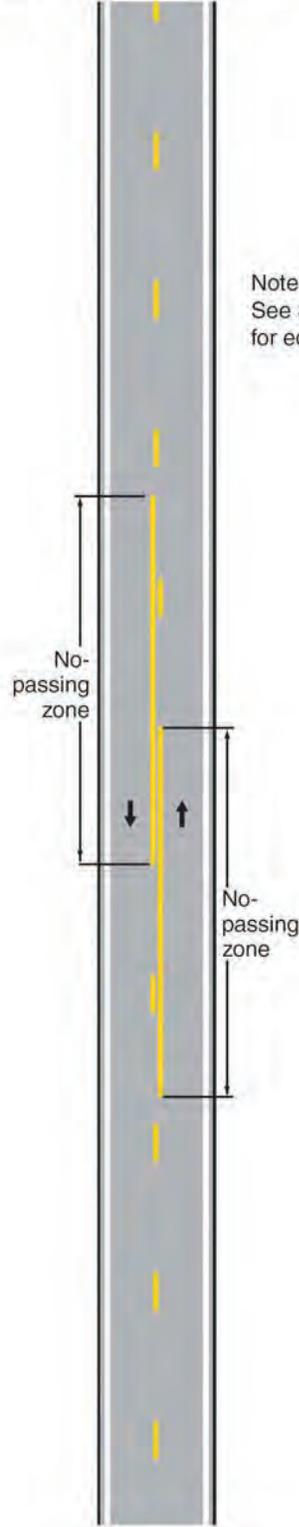
(This space left intentionally blank)

Figure 3B-1. Examples of Two-Lane, Two-Way Marking Applications

**a - Typical two-lane, two-way marking
with passing permitted in both directions**



**b - Typical two-lane, two-way marking
with no passing zones**

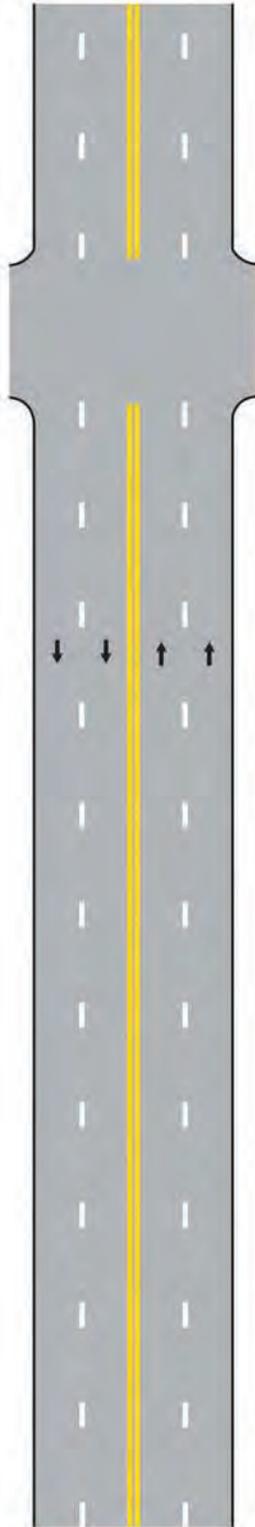


Legend
→ Direction of travel

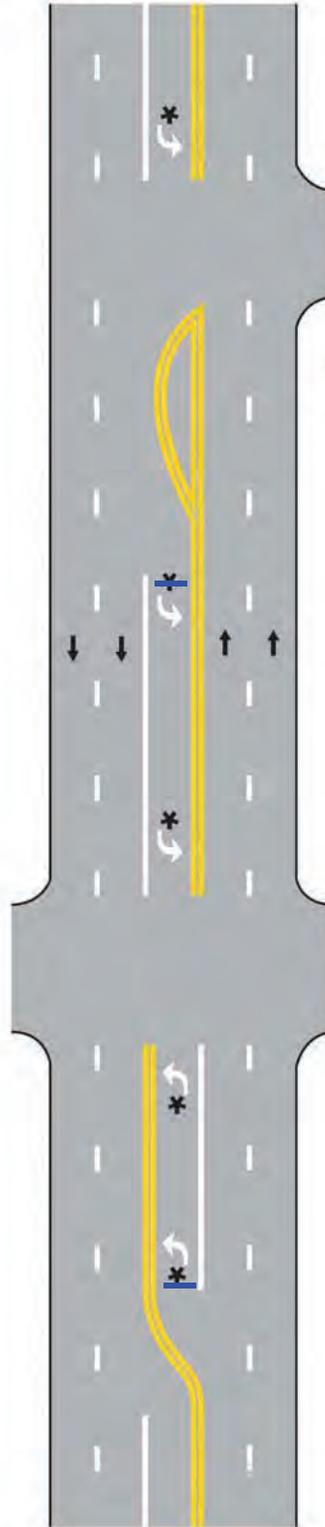
Note:
See Section 3B.07
for edge line warrants.

Figure 3B-2. Examples of Four-or-More Lane, Two-Way Marking Applications

a - Typical multi-lane, two-way marking



b - Typical multi-lane, two-way marking with single lane left turn channelization



- Legend
- * Optional
 - Direction of travel

Note:
See Section 3B.07
for edge line warrants.

Figure 3B-3. Examples of Three-Lane, Two-Way Marking Applications

a - Typical three-lane, two-way marking with passing permitted in single-lane direction



b - Typical three-lane, two-way marking with passing prohibited in single-lane direction



Legend
→ Direction of travel

Figure 3B-4. Example of Three-Lane, Two-Way Marking for Changing Direction of the Center Lane

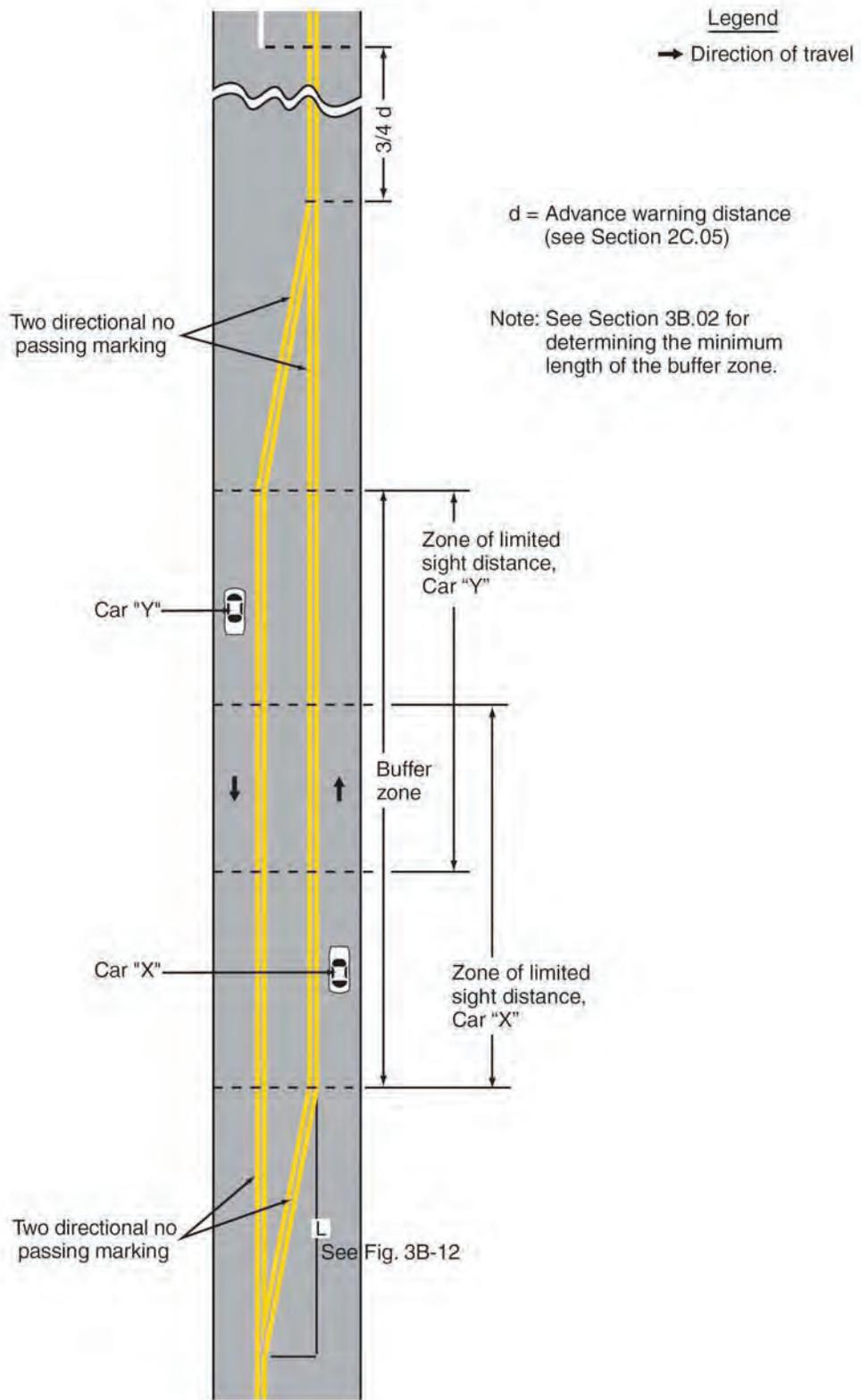
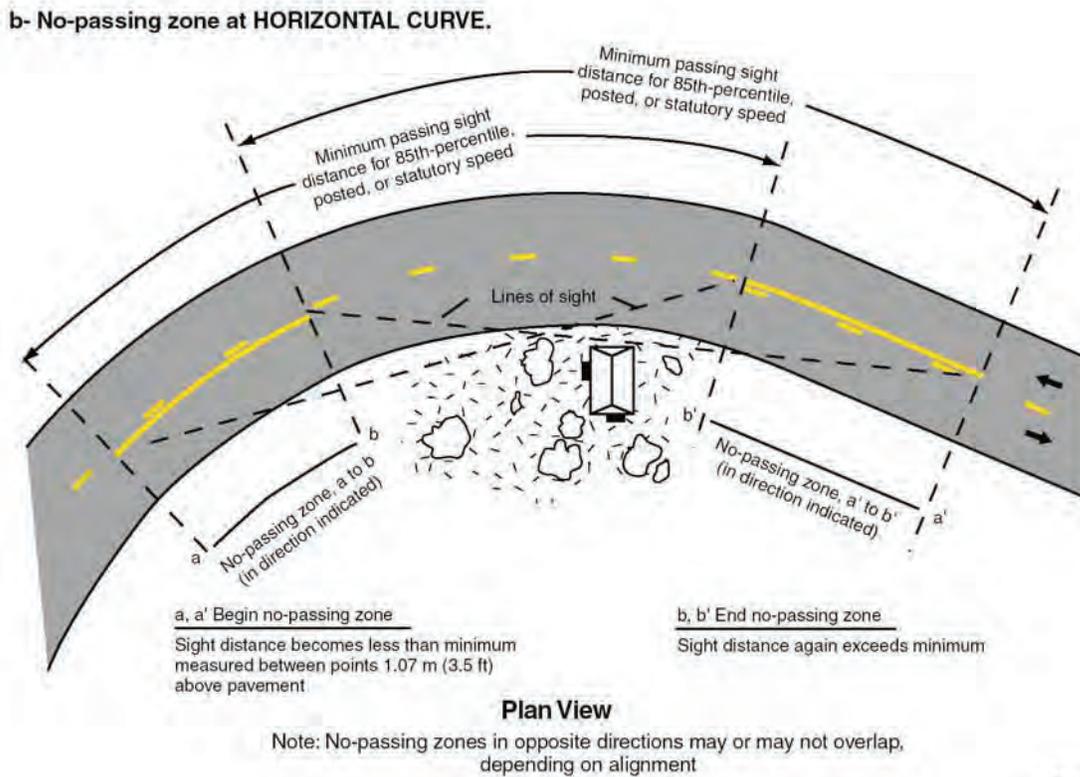
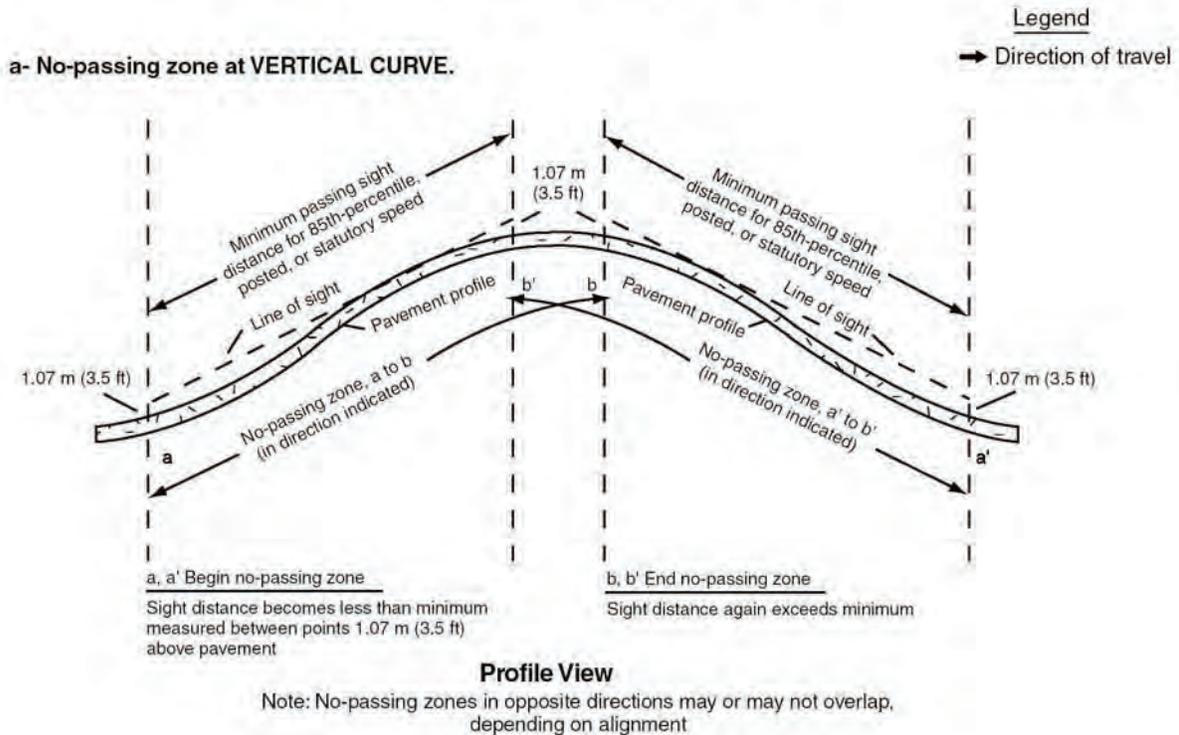


Figure 3B-5. Method of Locating and Determining the Limits of No-Passing Zones at Curves



Not to scale

Figure 3B-6. Example of Reversible Lane Marking Application

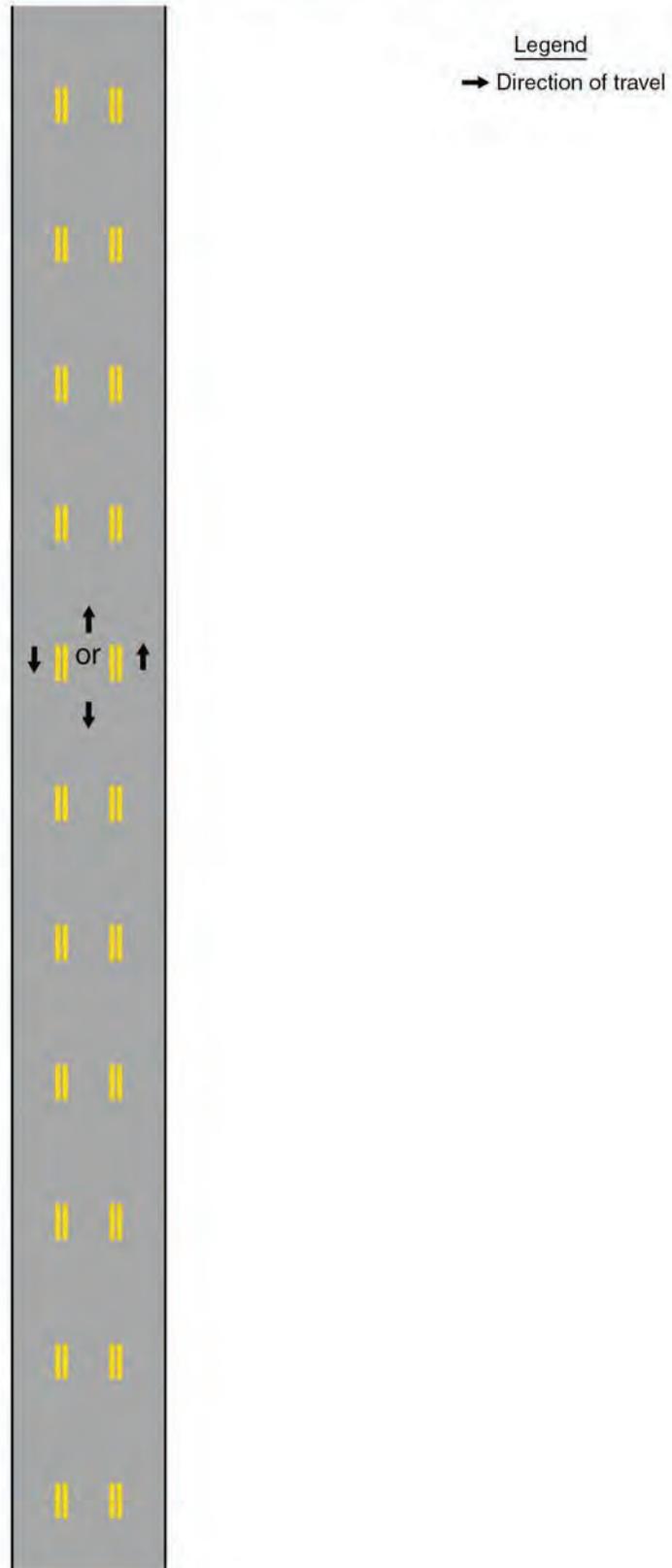


Figure 3B-7. Example of Two-Way Left-Turn Lane Marking Applications

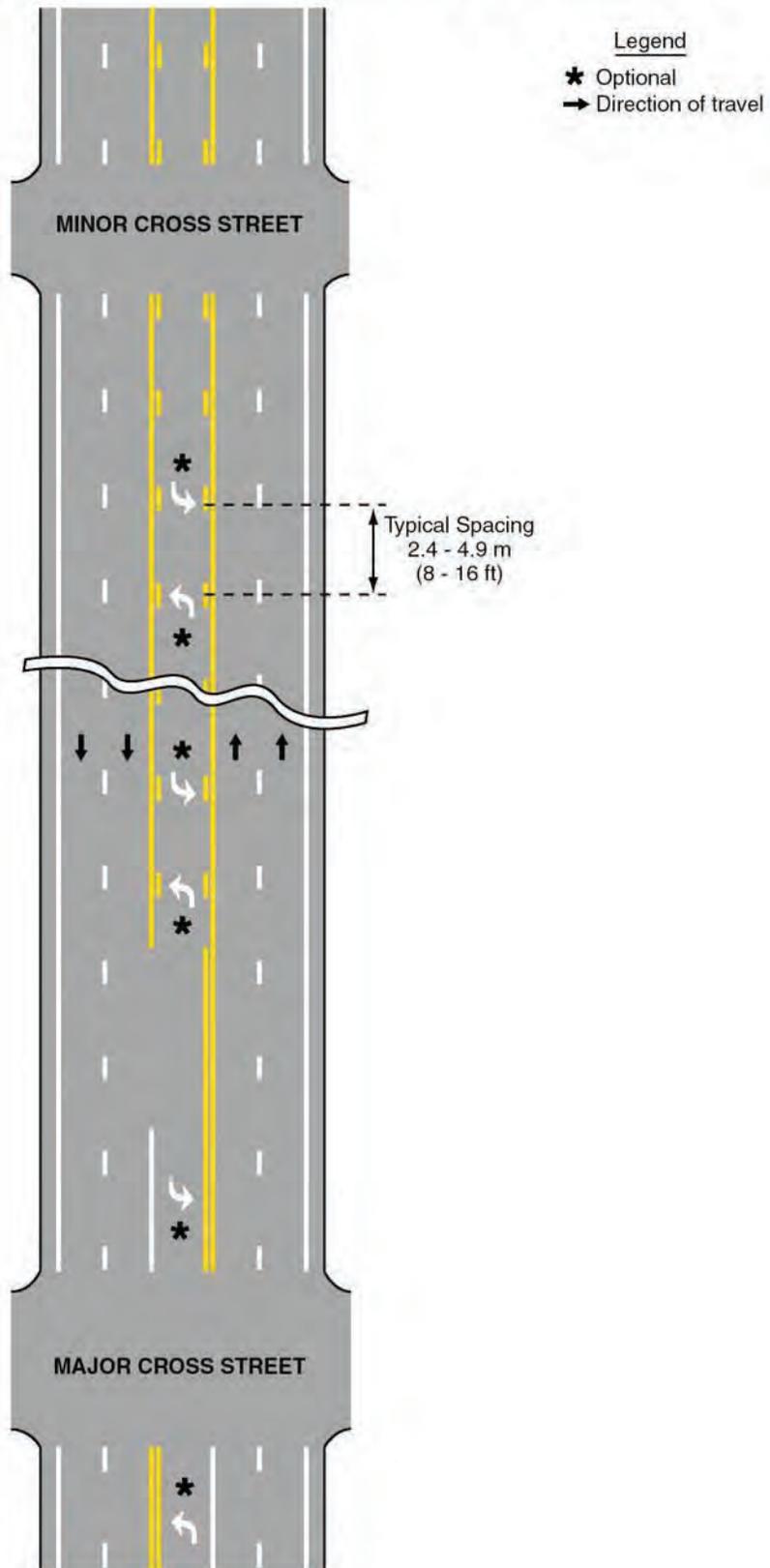
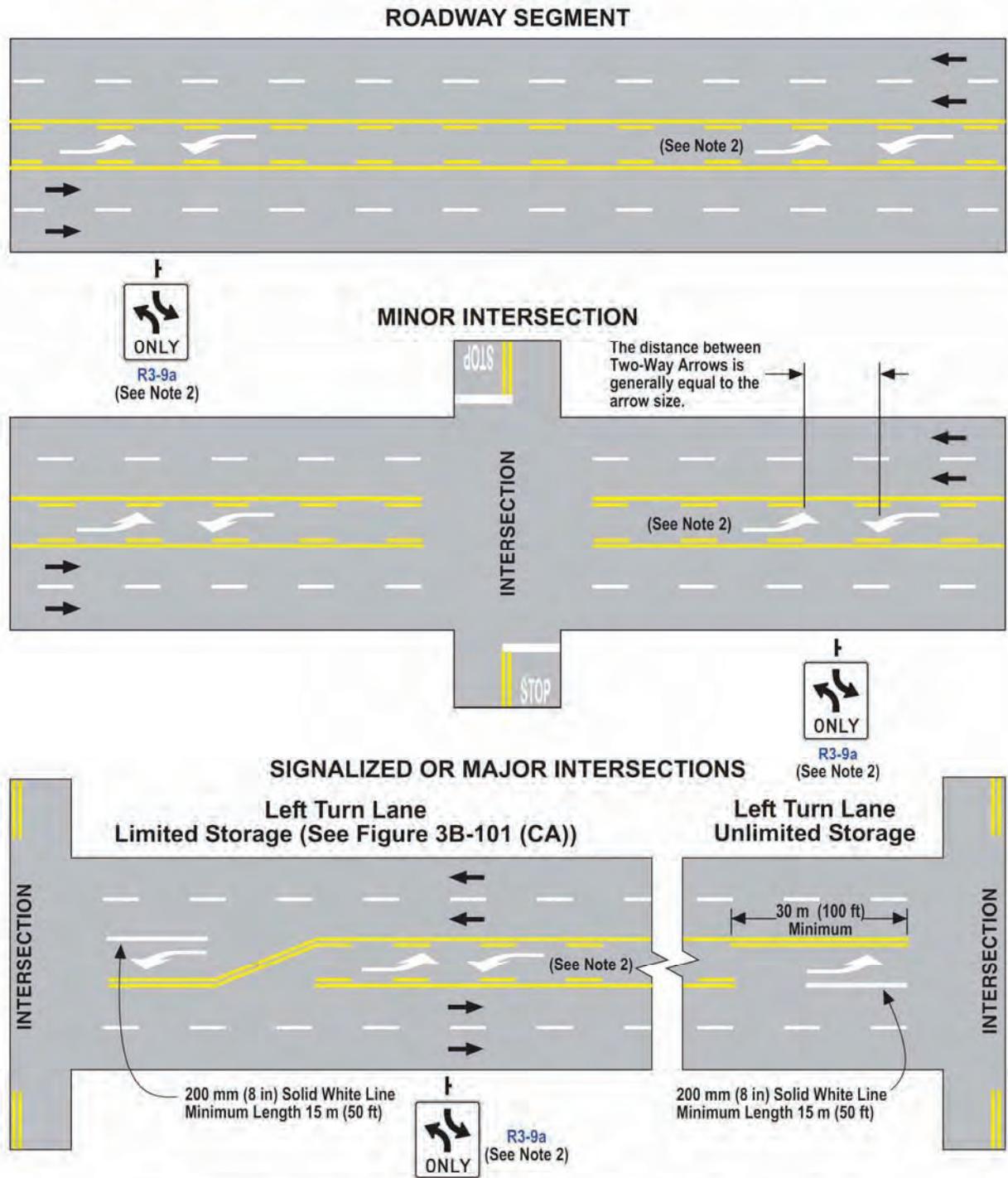


Figure 3B-7 (CA). Example of Two-Way Left-Turn Lane Marking Applications



- NOTES:**
1. See Figure 3A-108 (CA) for Two-Way Left-Turn Lane line markings.
 2. Two-Way Pavement Arrows and the R3-9a sign are optional.

LEGEND

➔ Direction of Travel

 Two-Way Pavement Arrows

NOT TO SCALE

Figure 3B-8. Examples of Channelizing Line Applications for Exit Ramp Markings (Sheet 1 of 2)

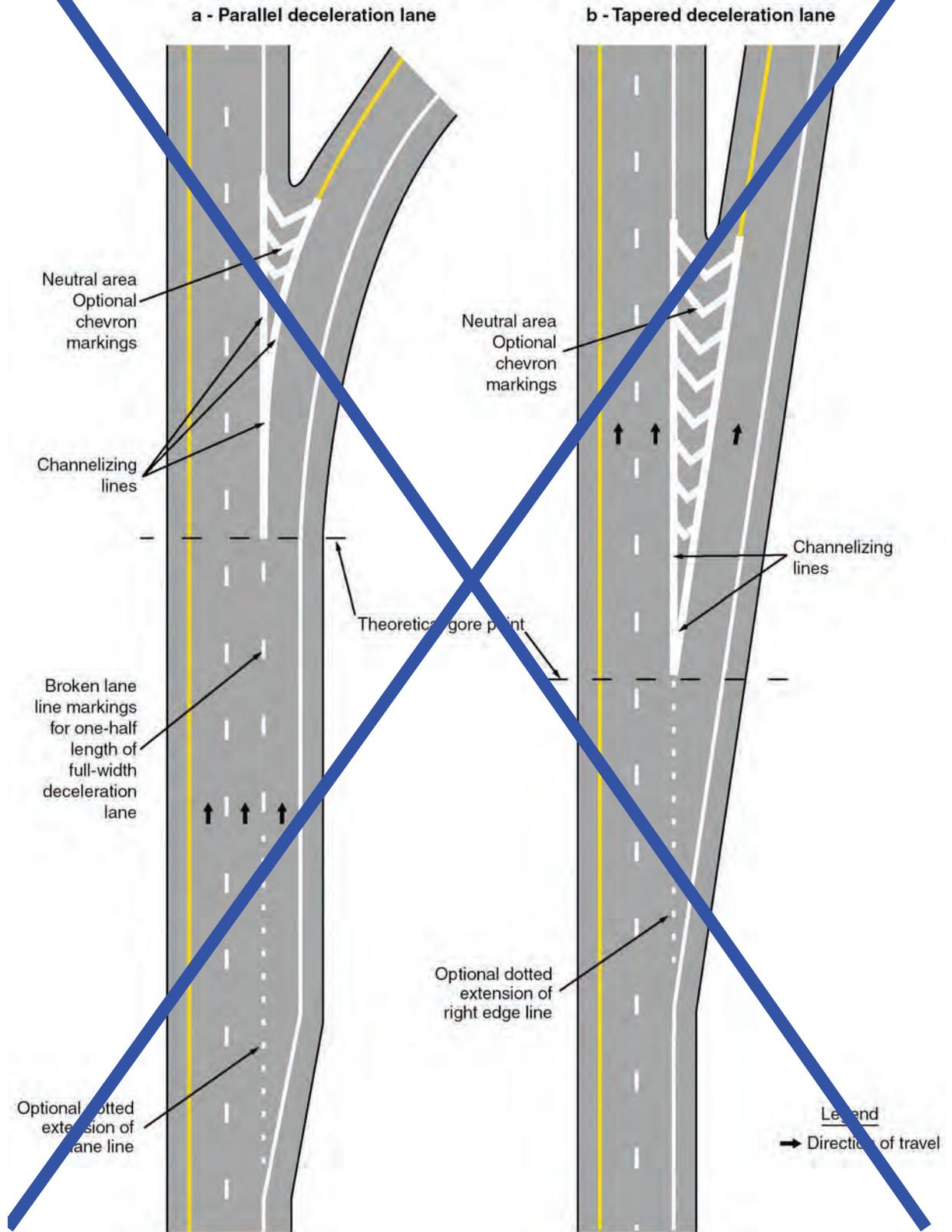


Figure 3B-8. Examples of Channelizing Line Applications for Exit Ramp Markings (Sheet 2 of 2)

c - Auxiliary lane, such as at cloverleaf interchange

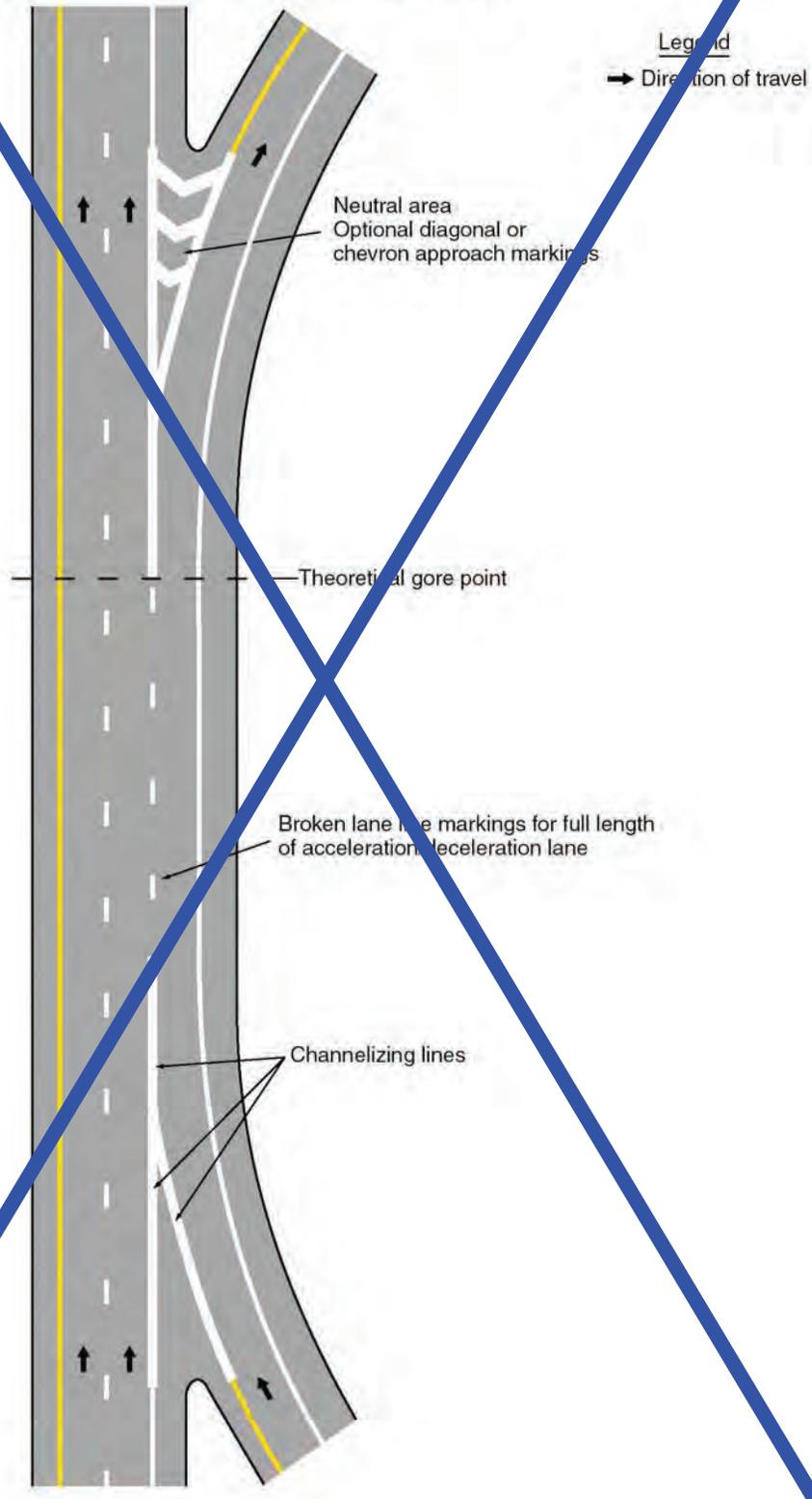


Figure 3B-8 (CA). Example of Signing and Channelizing Line Applications for Exit Ramp Markings (Sheet 1 of 3)

a - Parallel deceleration lane

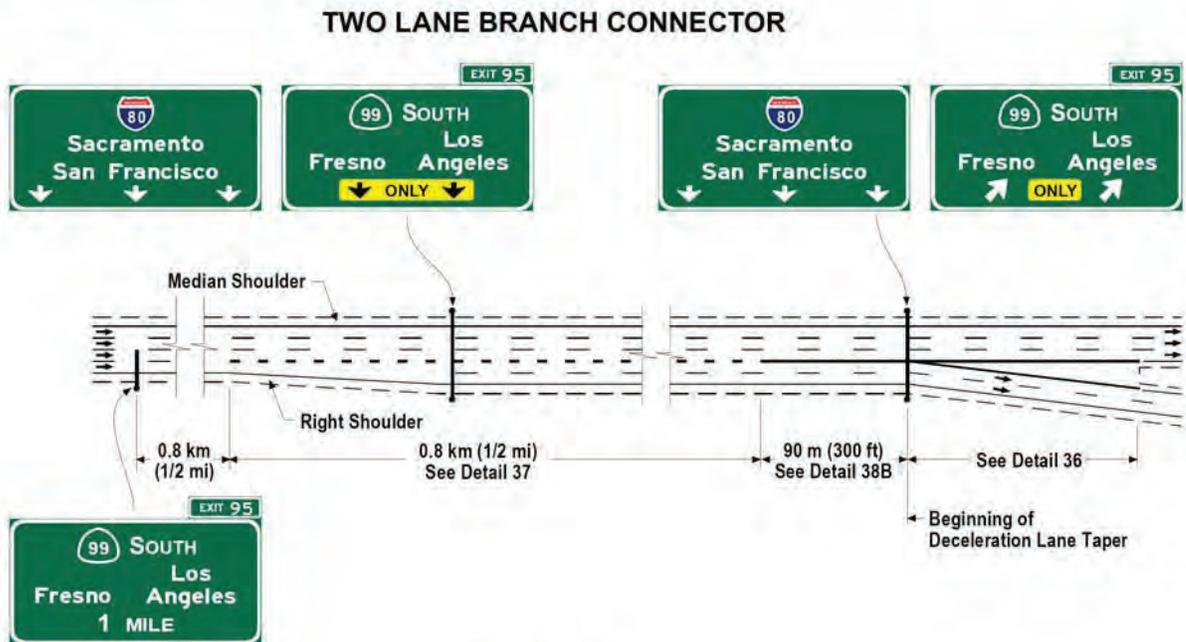
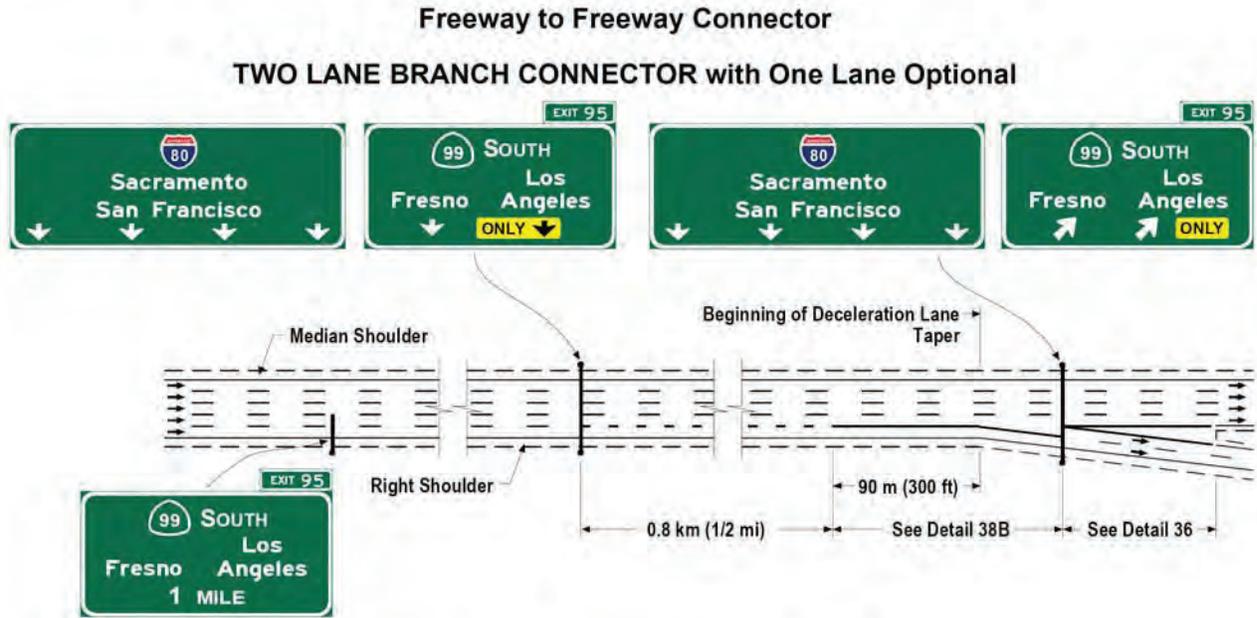
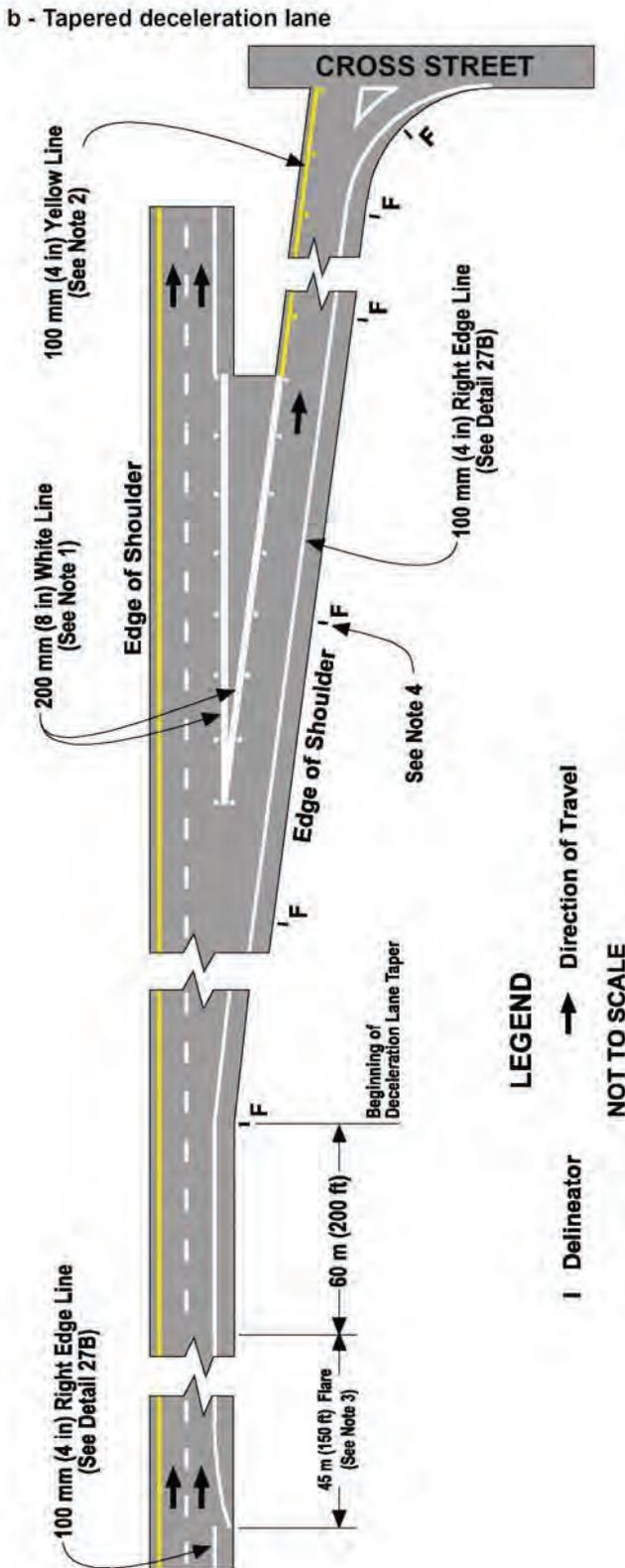


Figure 3B-8 (CA). Example of Signing and Channelizing Line Applications for Exit Ramp Markings (Sheet 2 of 3)

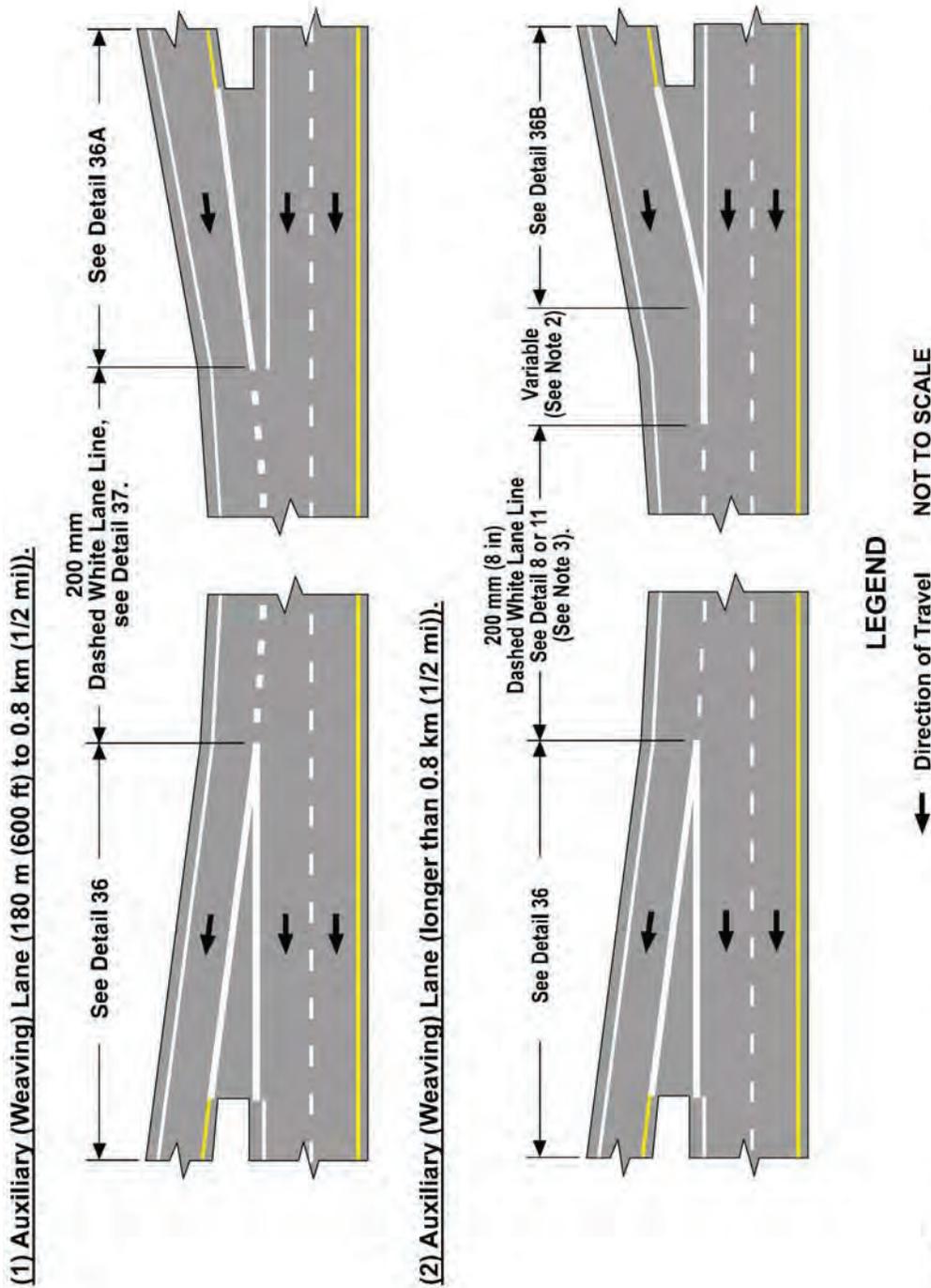


NOTES:

1. Place a 200 mm (8 in) Solid White Line and One-Way Clear Retroreflective Markers on 7.32 m (24 ft) centers. See Detail 36.
2. Place a 100 mm (4 in) Solid Yellow Left Edge Line and One-Way Yellow Retroreflective Pavement Markers on 7.32 m (24 ft) centers. See Detail 25A.
3. A flared Right Edge Line 45 m (150 ft) in advance of an exit ramp, is recommended where climatic conditions, such as areas that experience heavy fog, may require additional guidance. In areas that normally do not experience these conditions, a continuous edge line may be used. See also Section 3B.11, Advance Markers - Exit Ramps.
4. Place delineators 0.6 m (2 ft) to 1.8 m (6 ft) outside edge of paved shoulder, approximately 60 m (200 ft) apart with a minimum of 3 delineators per tangent. For additional details on delineator locations and spacing on curves, see Figure 3D-1 and 3D-102 (CA).
5. See Figure 3B-22 (CA) for Ramp Terminal Markings and Section 2E.50.

Figure 3B-8 (CA). Example of Signing and Channelizing Line Applications for Exit Ramp Markings (Sheet 3 of 3)

c - Auxiliary (Weaving) Lane, such as at Cloverleaf Interchange



NOTES:

1. Auxiliary (Weaving) Lanes less than 180 m (600 ft) are normally marked as Exit Ramps (see Sheets 1 and 2) and Entrance Ramps (see Figure 3B-9).
2. A 200 mm (8 in) Solid White Channelizing Line should be continued for approximately one-tenth the length of the acceleration lane beyond the tangent point. See Detail 38A.
3. A 100 mm (4 in) Dashed White Lane Line (Detail 8 or 11) is normally used for the remaining length of the lane. However, in those locations where the lane may give the appearance of an added lane and to discourage its use by through traffic, a 200 mm (8 in) Dashed White Channelizing Line (Detail 37) may be considered.

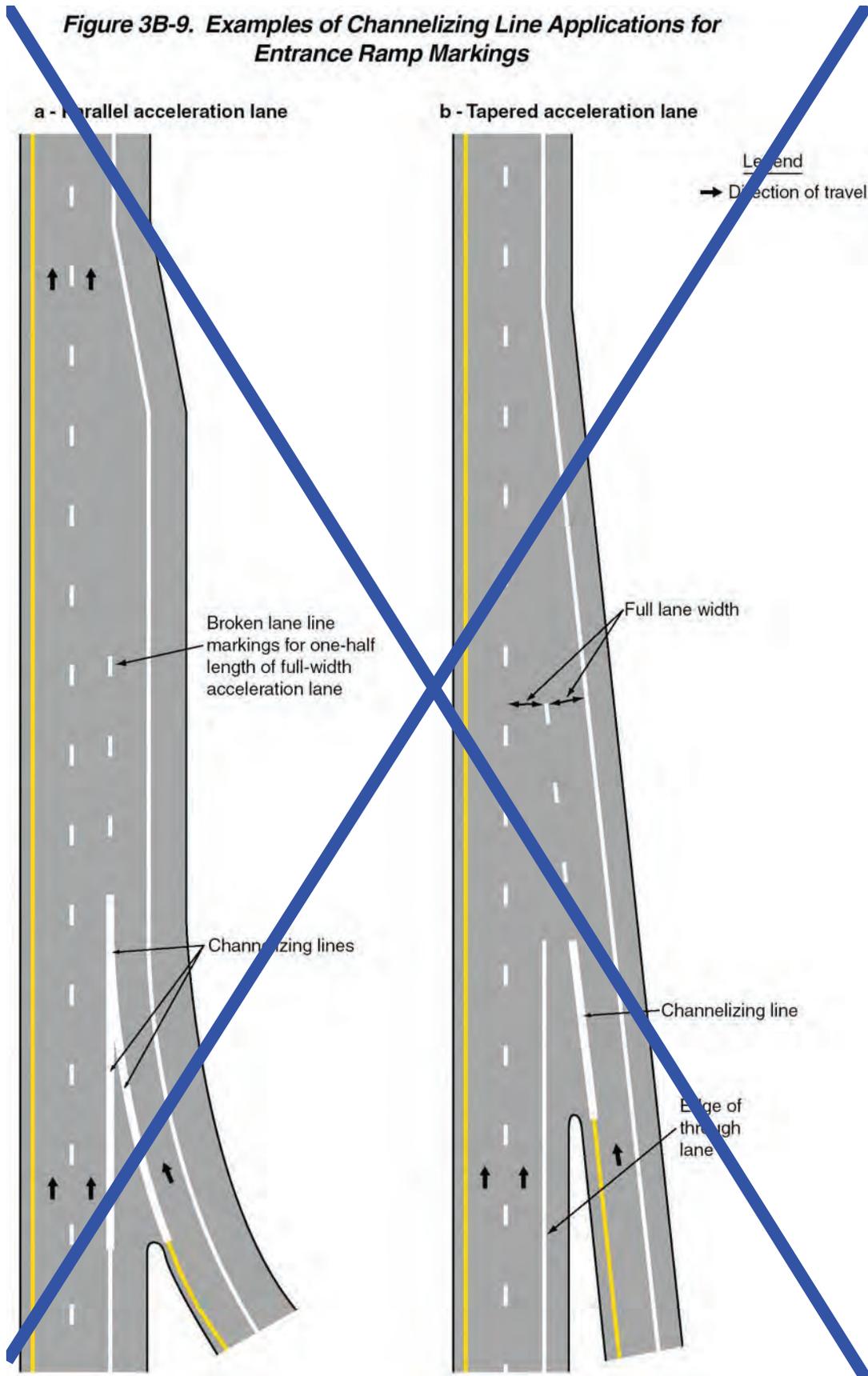
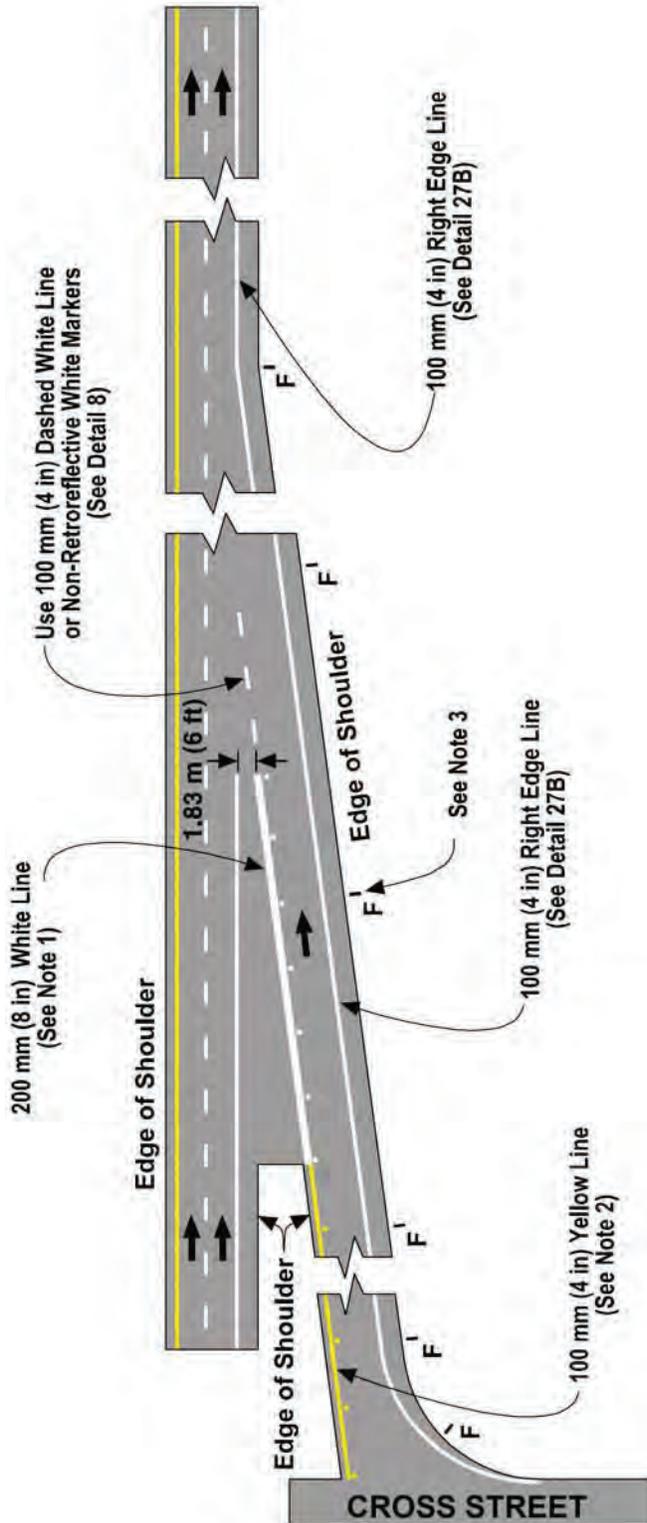


Figure 3B-9 (CA). Examples of Channelizing Line Application for Entrance Ramp Marking (Sheet 1 of 2)



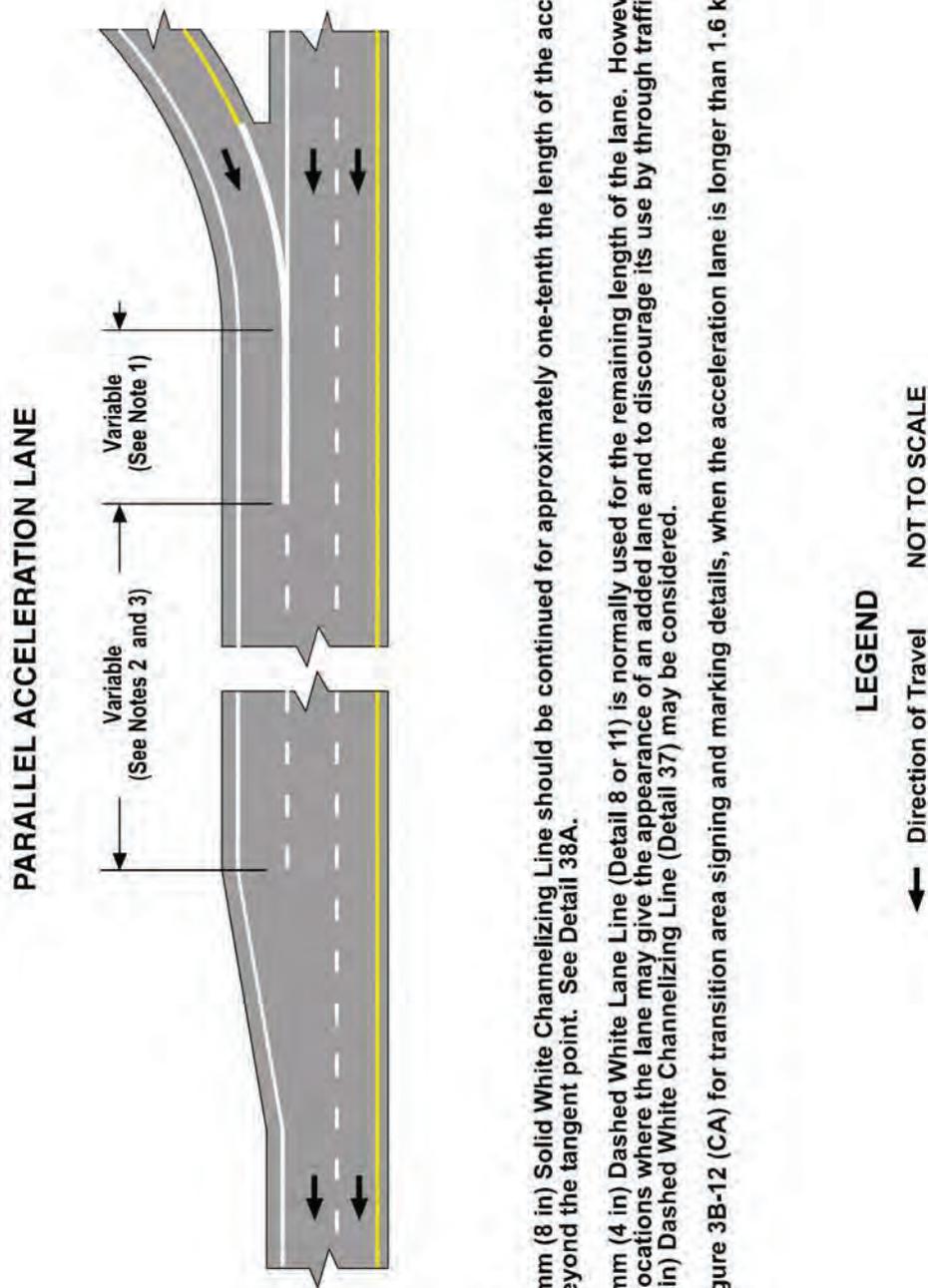
NOTES:

1. Place a 200 mm (8 in) Solid White Line and One-Way Clear Retroreflective Markers on 7.32 m (24 ft) centers. See Detail 36A.
2. Place a 100 mm (4 in) Solid Yellow Left Edge Line and One-Way Yellow Retroreflective Pavement Markers on 7.32 m (24 ft) centers. See Detail 25A.
3. Place delineators 0.6 m (2 ft) to 1.8 m (6 ft) outside the edge of paved shoulder, approximately 60 m (200 ft) apart with a minimum of 3 delineators per tangent. For additional details on delineator locations and spacing on curves, see Figure 3D-1 and 3D-102 (CA).
4. When the entrance ramp lane becomes an added freeway lane, it shall be marked as a standard lane line. If the additional lane terminates at an exit ramp within 0.8 km (1/2 mi).

LEGEND

- Delineator
 - Direction of Travel
- NOT TO SCALE**

Figure 3B-9 (CA). Examples of Channelizing Line Application for Entrance Ramp Marking (Sheet 2 of 2)



NOTES:

1. A 200 mm (8 in) Solid White Channelizing Line should be continued for approximately one-tenth the length of the acceleration lane beyond the tangent point. See Detail 38A.
2. A 100 mm (4 in) Dashed White Lane Line (Detail 8 or 11) is normally used for the remaining length of the lane. However, in those locations where the lane may give the appearance of an added lane and to discourage its use by through traffic, a 200 mm (8 in) Dashed White Channelizing Line (Detail 37) may be considered.
3. See Figure 3B-12 (CA) for transition area signing and marking details, when the acceleration lane is longer than 1.6 km (1 mi).

Figure 3B-10. Example of Lane Drop Markings at Exit Ramps

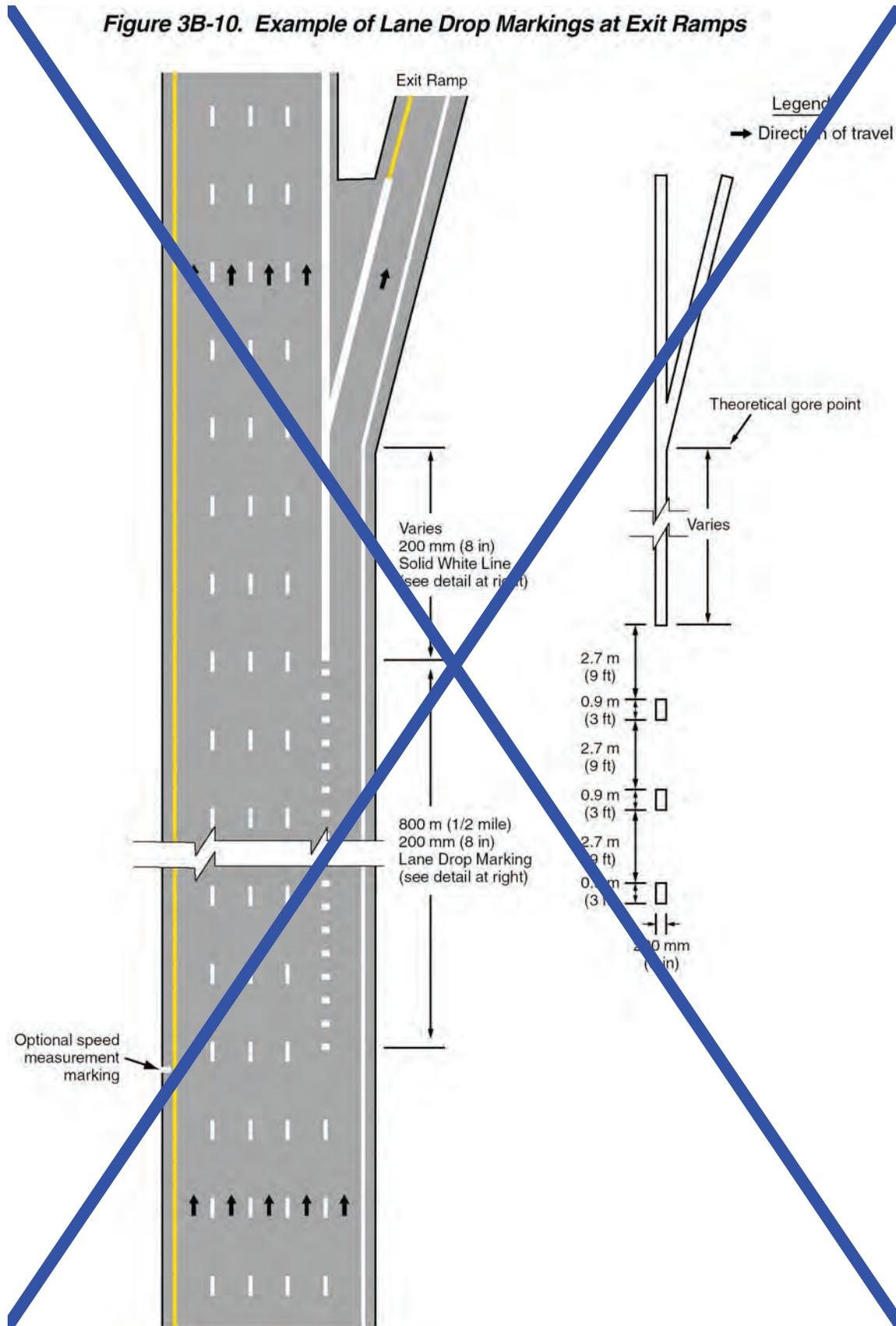
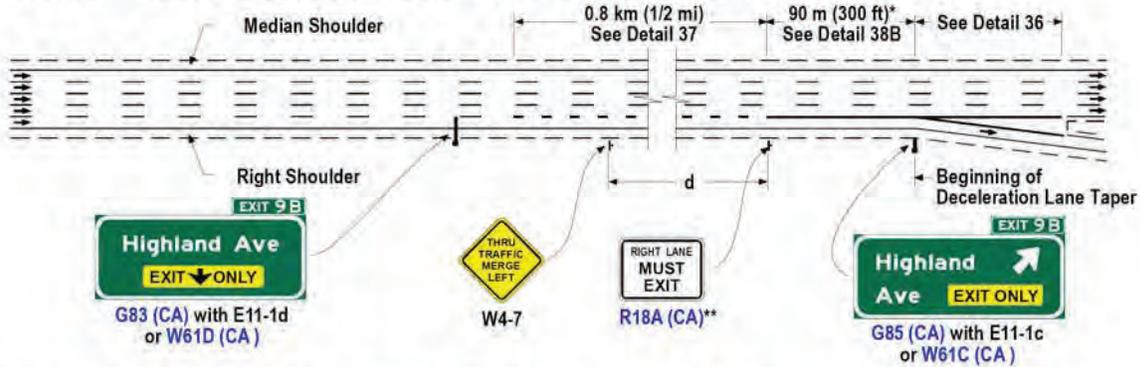
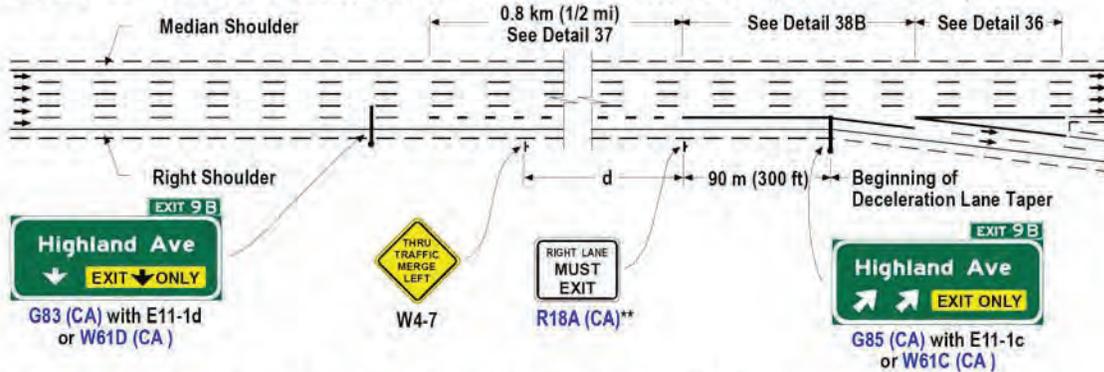


Figure 3B-10 (CA). Example of Lane Drop Signing and Markings at Exit Ramps

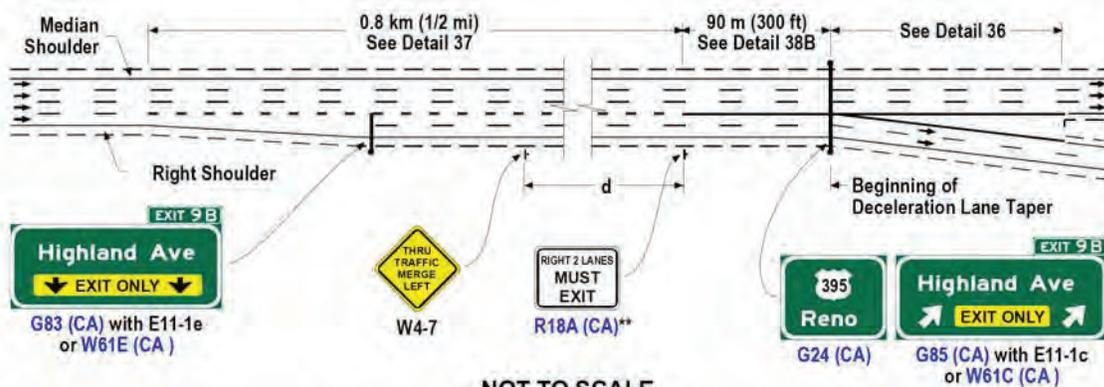
CASE: 1 - MAINLINE LANE DROP TO A ONE LANE EXIT



CASE: 2 - MAINLINE LANE DROP TO A TWO LANE EXIT (Optional Lane)



CASE: 3 - MAINLINE LANE DROP TO A TWO LANE EXIT



NOT TO SCALE

Notes:

* The solid line may be eliminated where additional weaving distance is needed. When it is eliminated, a RIGHT LANE EXITS AHEAD, W73 (CA) sign shall be used in lieu of the R18A sign.

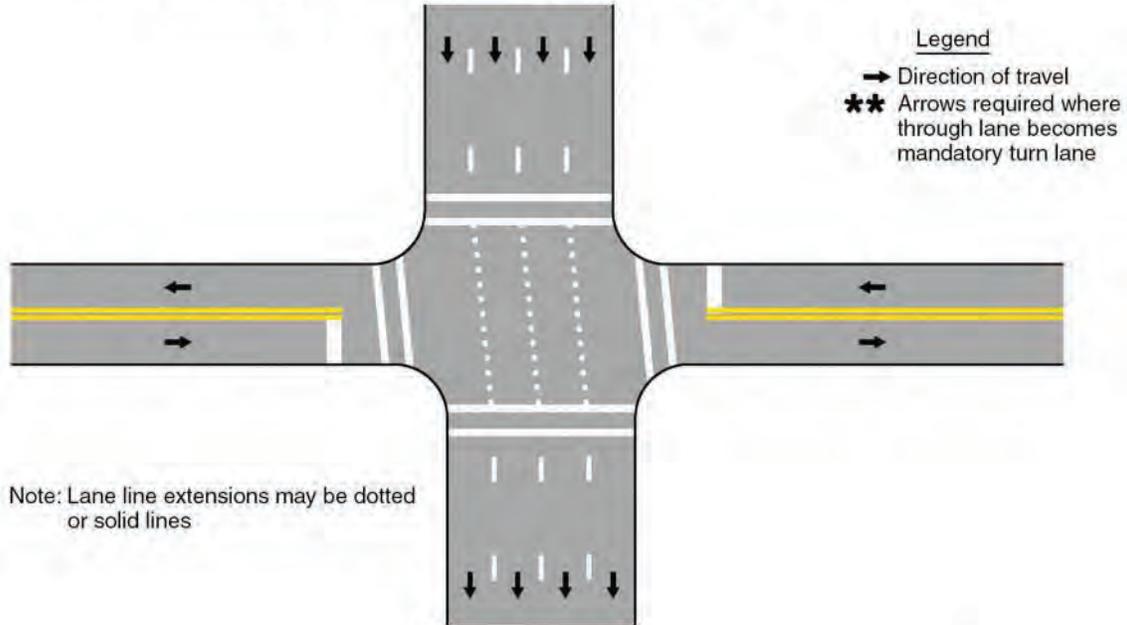
** At locations where the overhead EXIT ONLY (E11-1 Series or W61 (CA) Series) signs are not in place, a RIGHT LANE EXITS AHEAD, W73 (CA) sign shall be placed, approximately midway, between the W4-7 and the R18A signs.

LEGEND

- d = Advance Placement Distance (see Section 2C.05)
- ➔ Direction of Travel - - - Lane Drop Pattern

Figure 3B-11. Examples of Extensions through Intersections (Sheet 1 of 2)

a - Typical pavement markings with offset lane lines continued through the intersection and optional crosswalk lines and stop lines



b - Typical pavement markings with optional double-turn lane lines, lane-use turn arrows, crosswalk lines, and stop lines

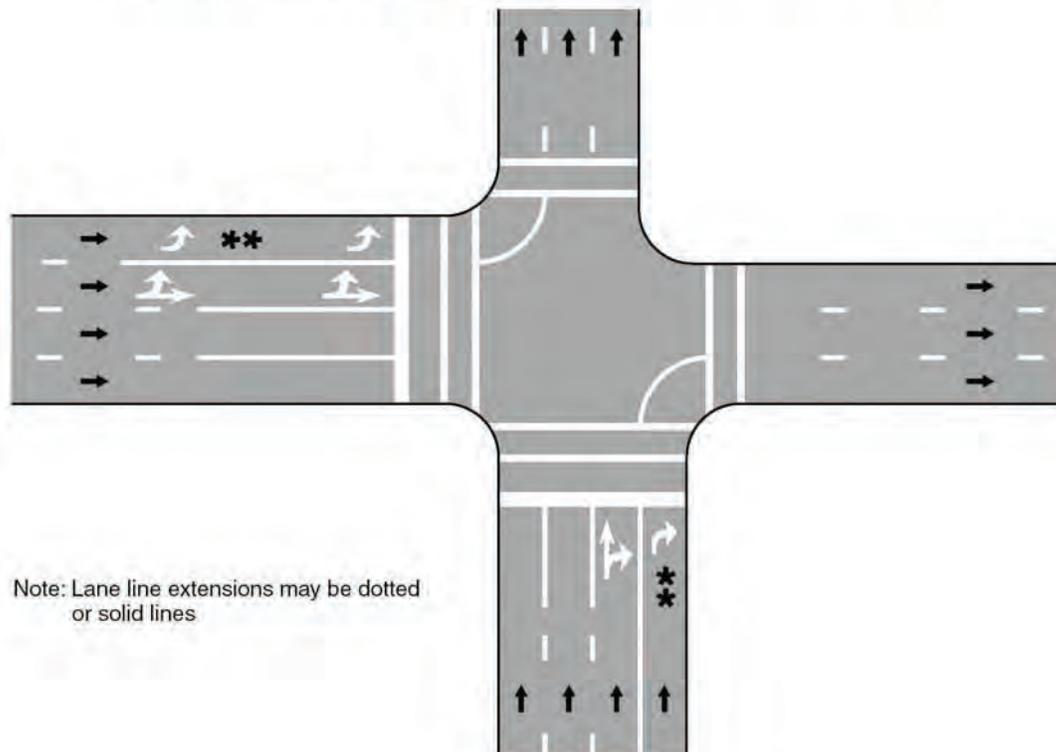


Figure 3B-11. Examples of Extensions through Intersections (Sheet 2 of 2)

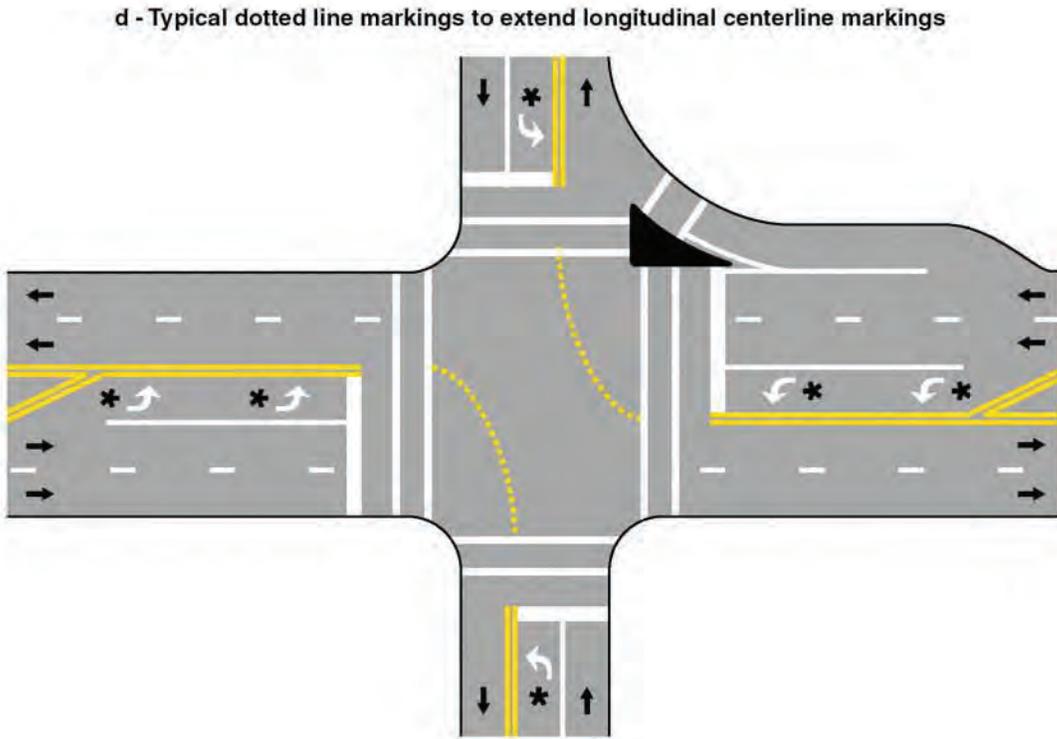
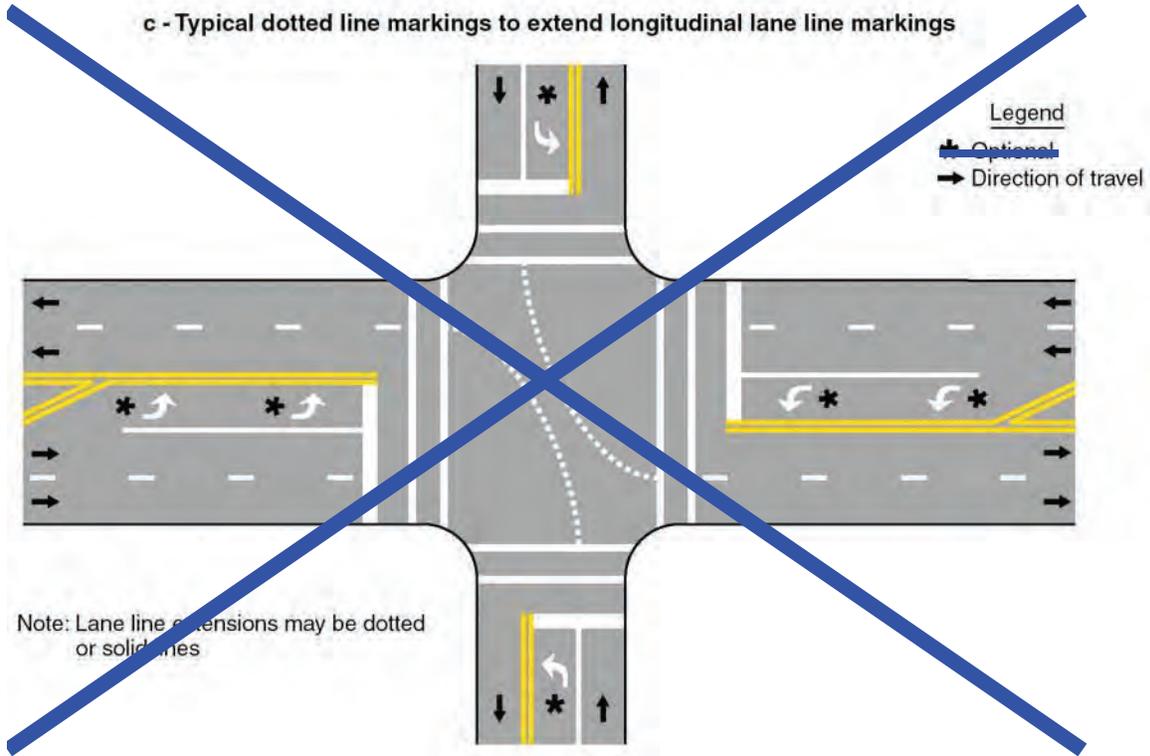
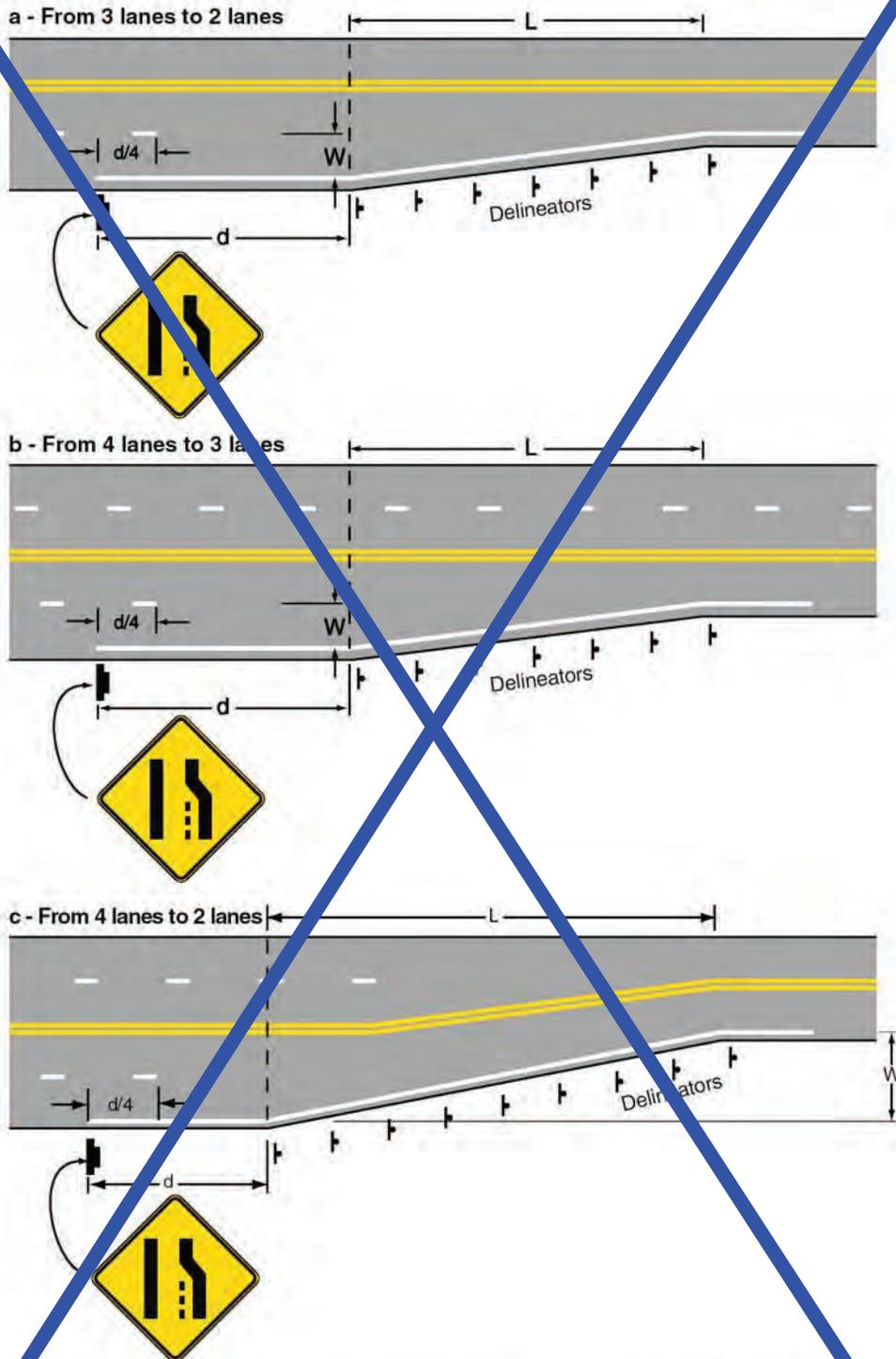


Figure 3B-12. Examples of Lane Reduction Markings



L = Length in meters (feet)
 S = Posted, 85th-percentile, or statutory speed in km/h (mph)
 W = Offset in meters (feet)
 d = Advance warning distance (see Section 2C.05)

For speeds 70 km/h (45 mph) or more:
 $L = 0.62 WS$ ($L=WS$)

For speeds less than 70 km/h (45 mph):
 $L = \frac{WS^2}{155}$ ($L = \frac{WS^2}{60}$)

See Section 3D.04 for delineator spacing.

Figure 3B-12 (CA). Examples of Signs and Lane Reduction Markings (Sheet 1 of 3)

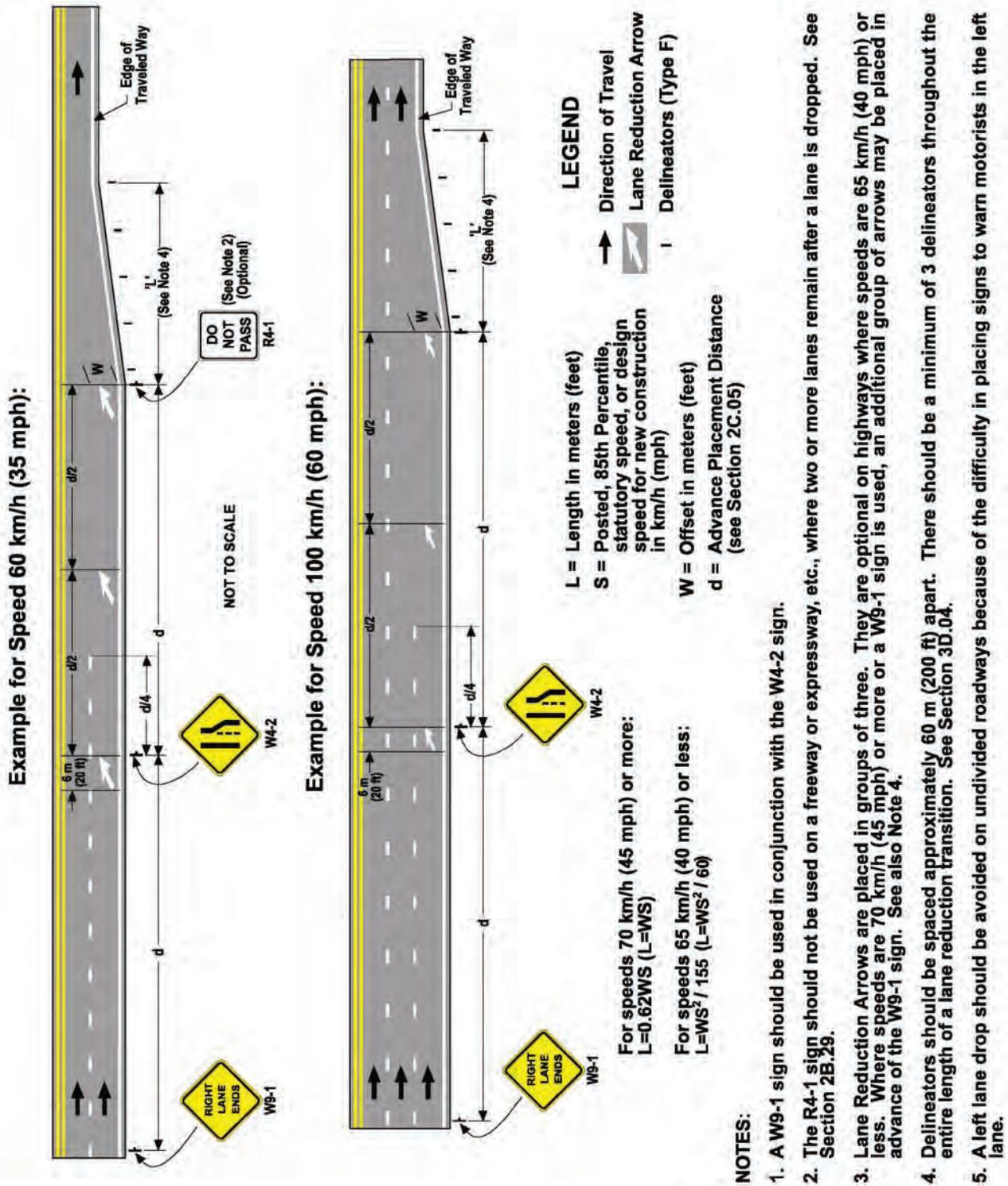


Figure 3B-12 (CA). Examples of Signs and Lane Reduction Markings (Sheet 2 of 3)

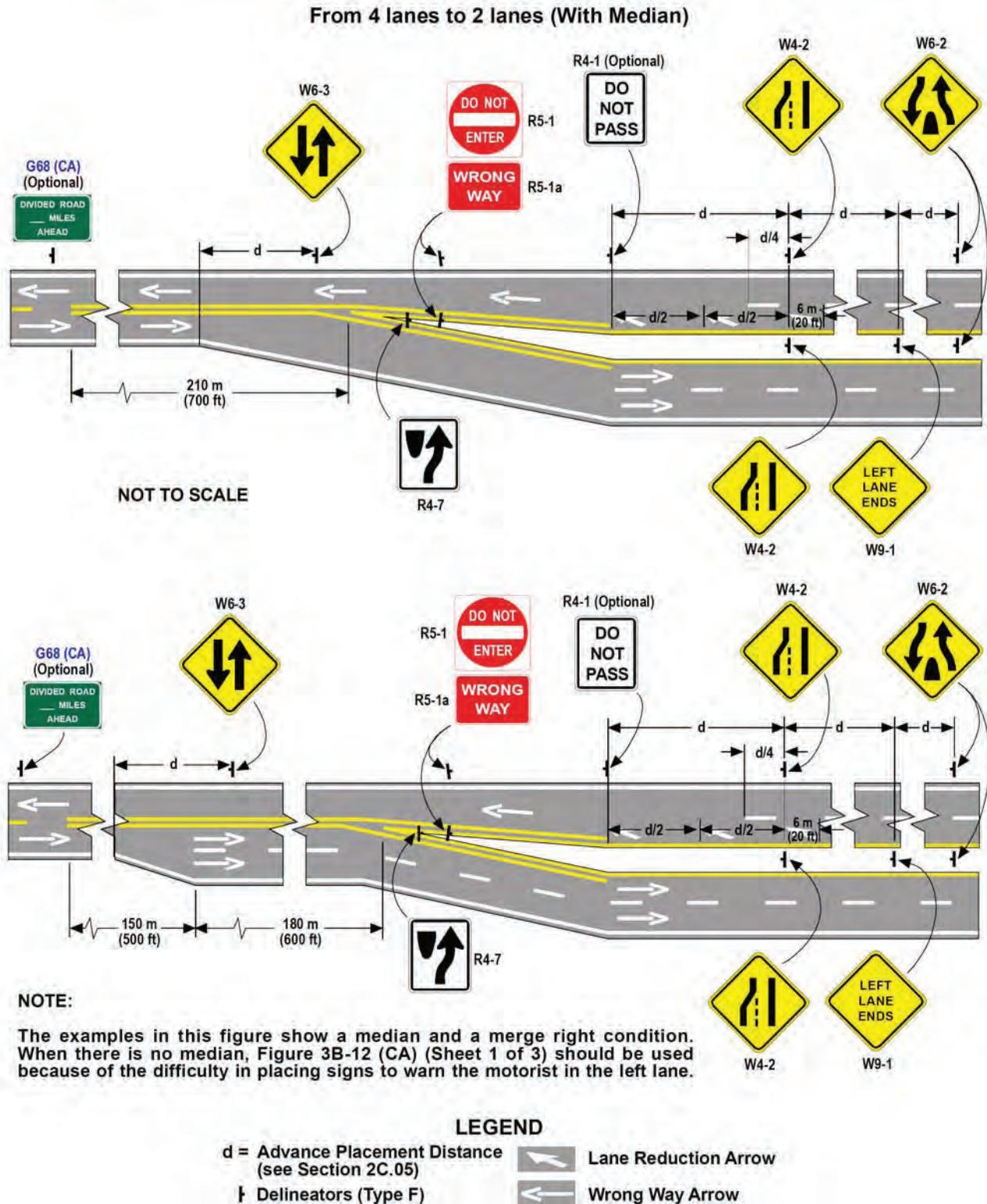
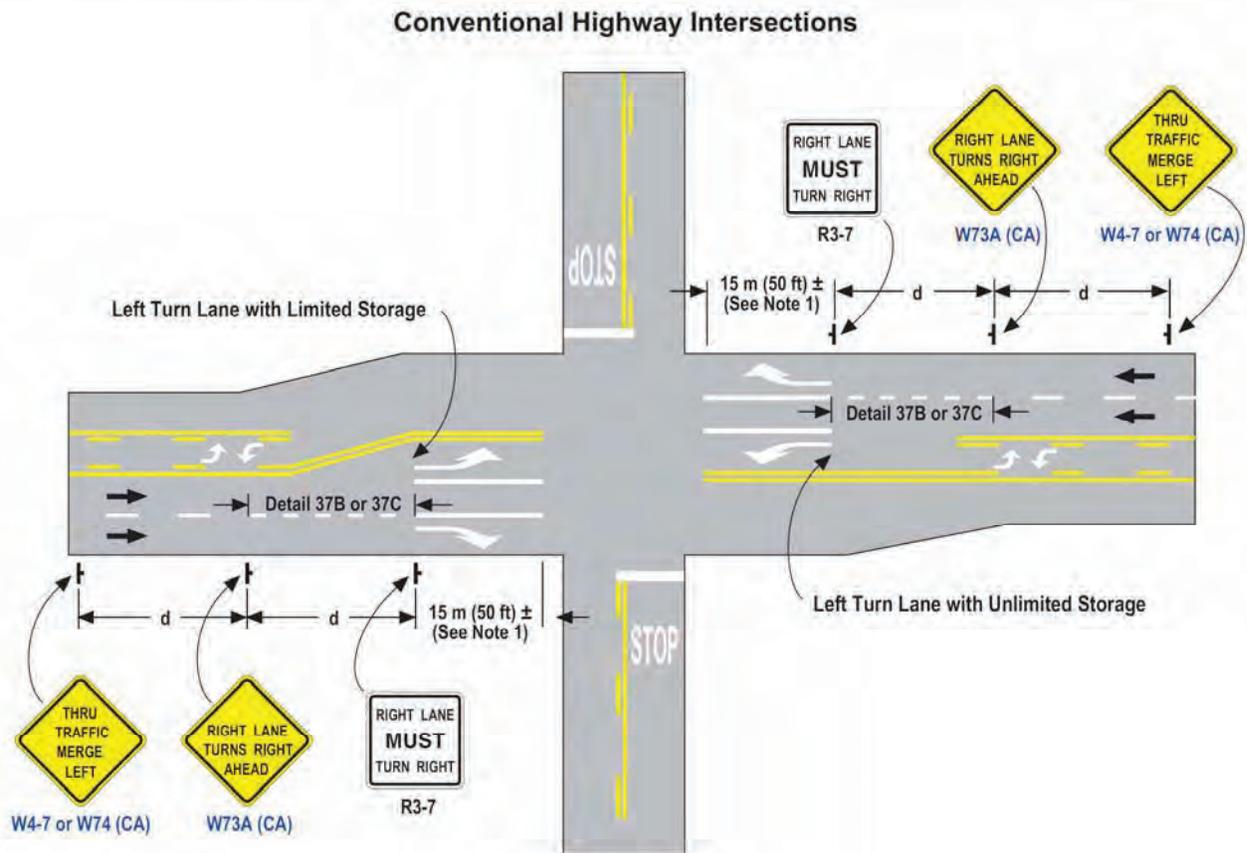


Figure 3B-12 (CA). Examples of Signs and Lane Reduction Markings (Sheet 3 of 3)



NOTES:

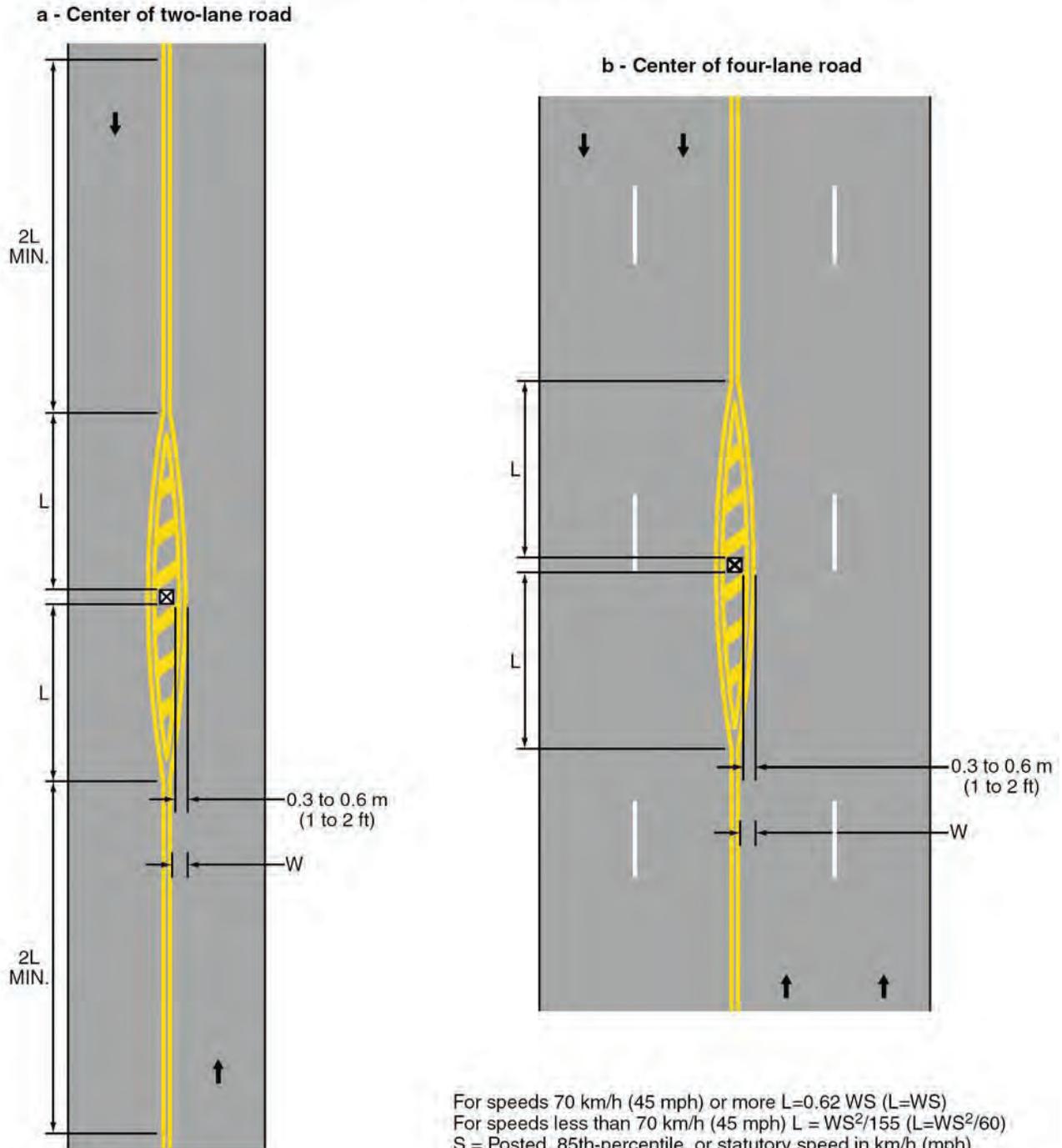
1. See Figure 3B-101 for taper and storage lengths. See Detail 37B and 37C for lane drop markings. The minimum length of solid channelizing line is 15 m (50 ft). However, if using Detail 37C, the minimum length will be 14.64 m (48 ft).
2. The RIGHT LANE TURNS RIGHT AHEAD, (W73A (CA)) sign should be placed in conjunction with the RIGHT LANE MUST TURN RIGHT (R3-7) sign and the appropriate lane line and markings. A THRU TRAFFIC MERGE LEFT (W4-7 or W74 (CA)) sign may be placed in advance of the W73A (CA) sign. However, adequate sight distance or proximity to a freeway ramp, cross road, etc., may dictate the need and location of additional signs and the length of the turn lane.

LEGEND

- ➔ Direction of Travel
- ▬ Pavement Arrows
- † Sign Location
- d = Advance Placement Distance (see Section 2C.05)

NOT TO SCALE

Figure 3B-13. Examples of Markings for Obstructions in the Roadway
 (Sheet 1 of 2)



- Legend**
- Direction of travel
 - ⊗ Obstruction

For speeds 70 km/h (45 mph) or more $L=0.62 WS$ ($L=WS$)
 For speeds less than 70 km/h (45 mph) $L = WS^2/155$ ($L=WS^2/60$)
 S = Posted, 85th-percentile, or statutory speed in km/h (mph)
 W = Offset distance in meters (ft)

Minimum length of : L = 30 m (100 ft) in urban areas
 L = 60 m (200 ft) in rural areas

Length "L" should be extended as required by sight distance conditions

Figure 3B-14. Examples of Yield Line Layouts

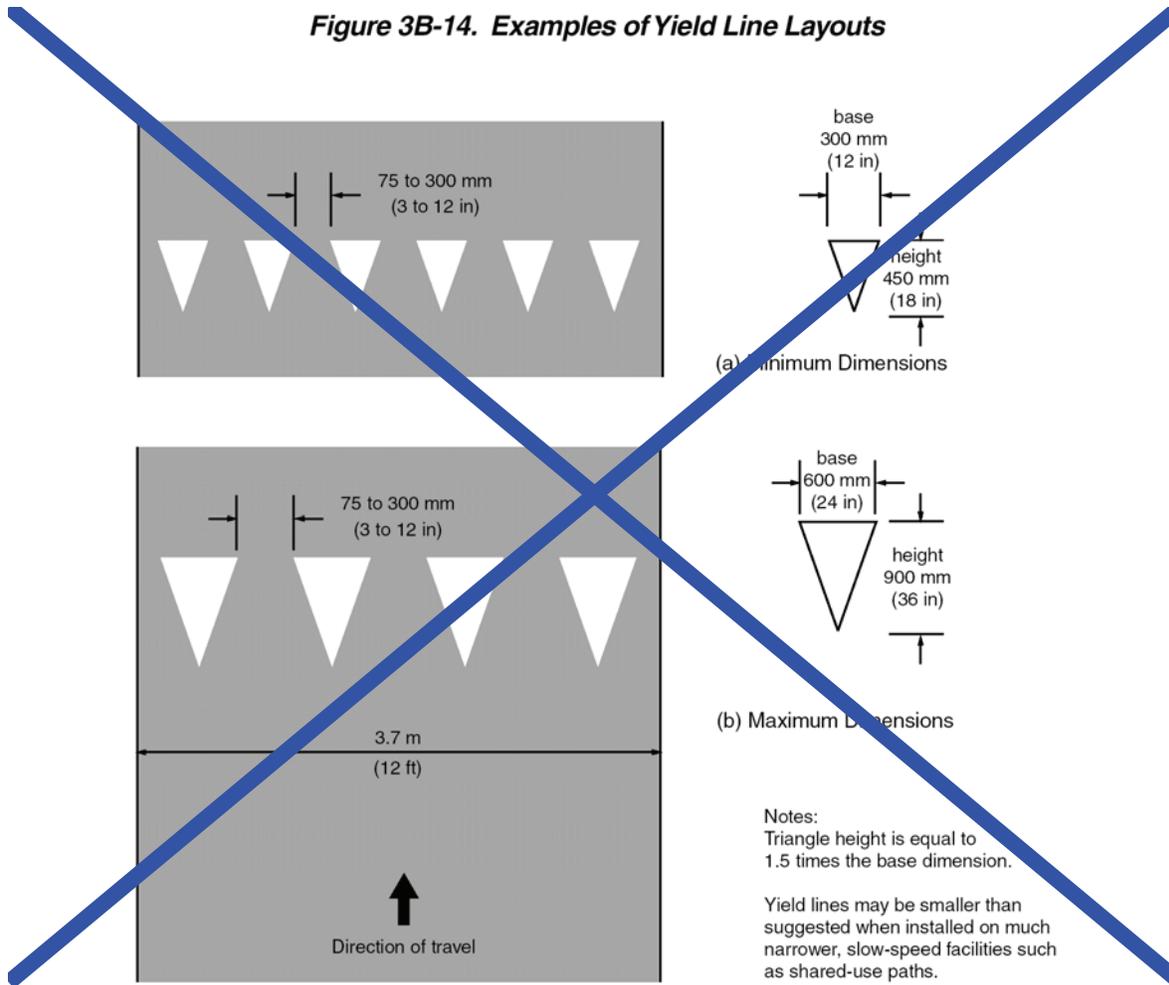


Figure 3B-14 (CA). Examples of Yield Line Layouts

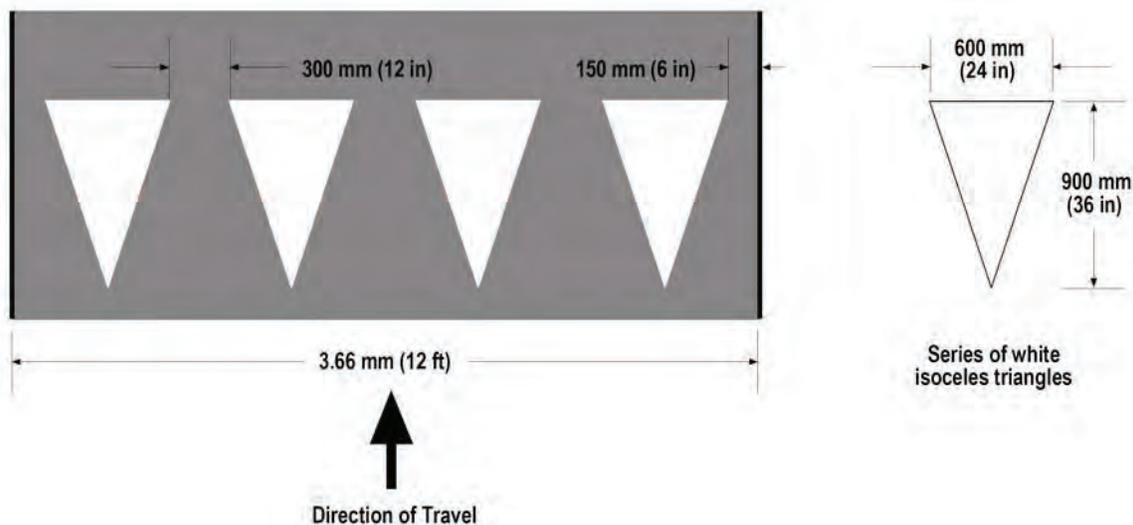
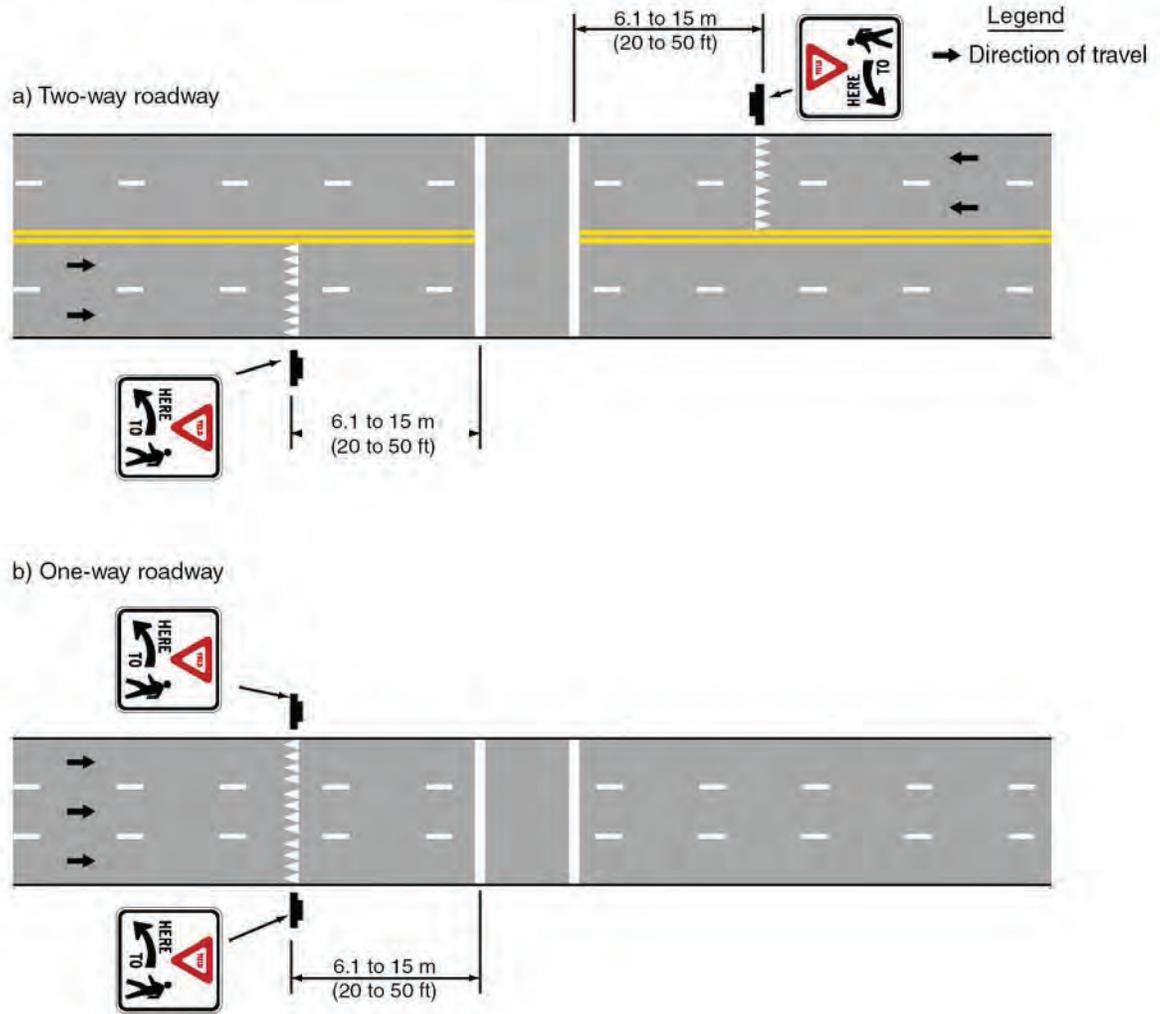


Figure 3B-15. Examples of Yield Lines at Unsignalized Midblock Crosswalks



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Figure 3B-16. Examples of Crosswalk Markings

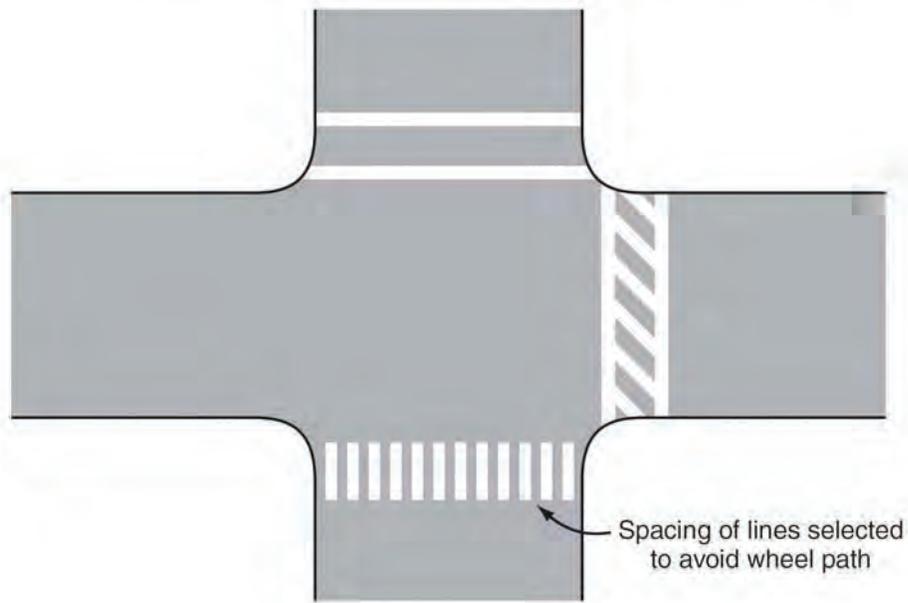


Figure 3B-17. Example of Crosswalk Markings for Exclusive Pedestrian Phase That Permits Diagonal Crossing

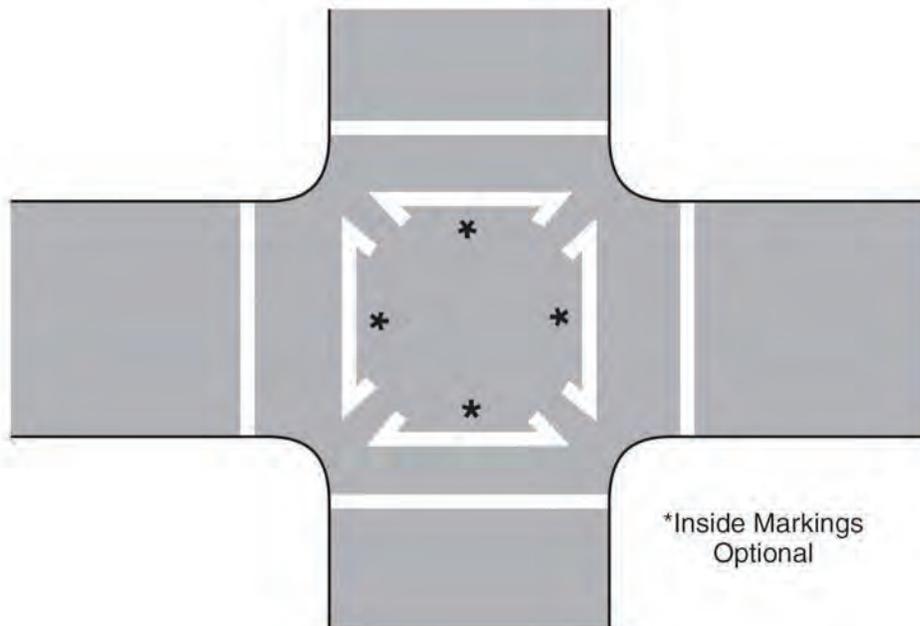


Figure 3B-18. Examples of Parking Space Markings

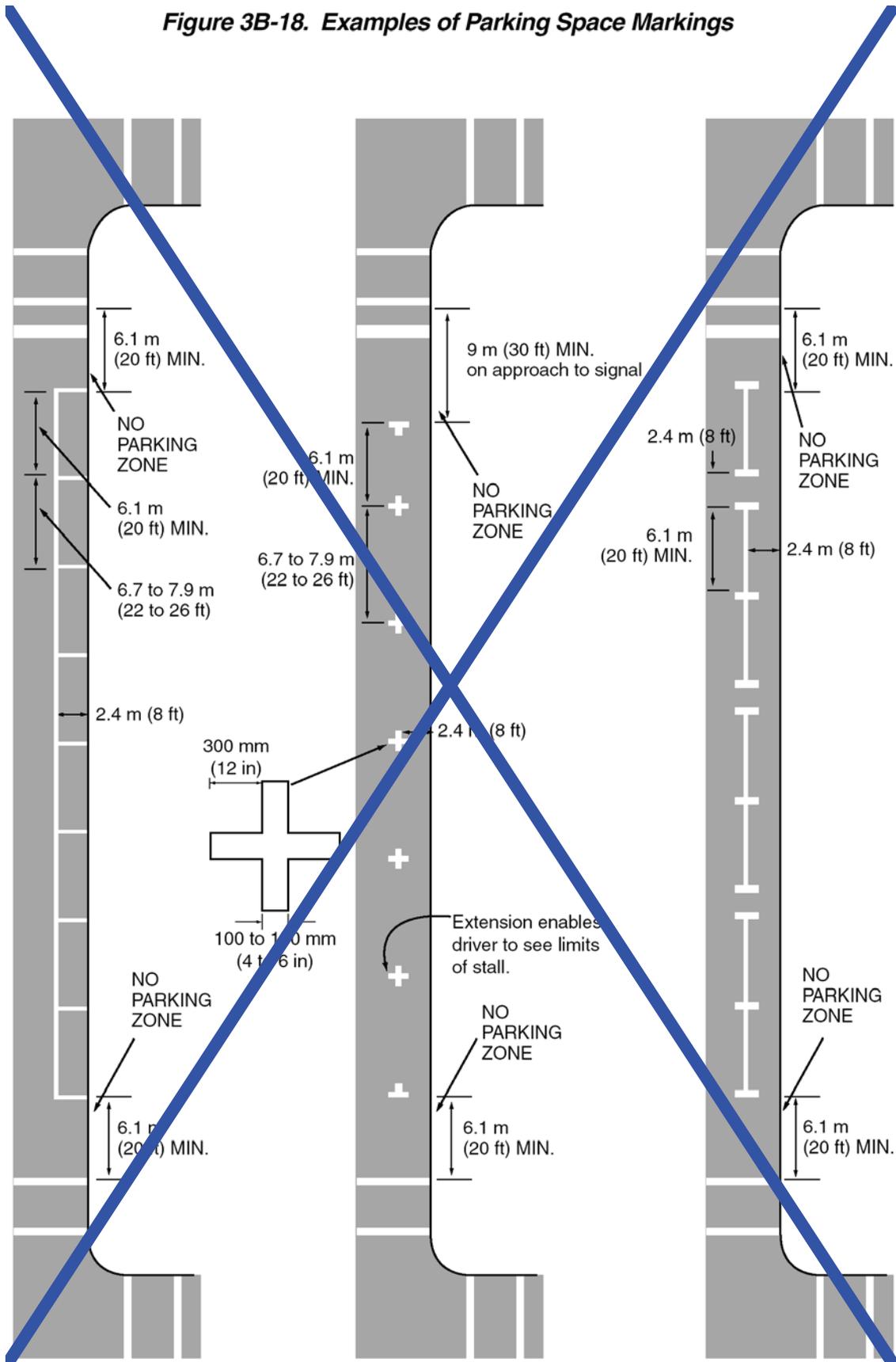
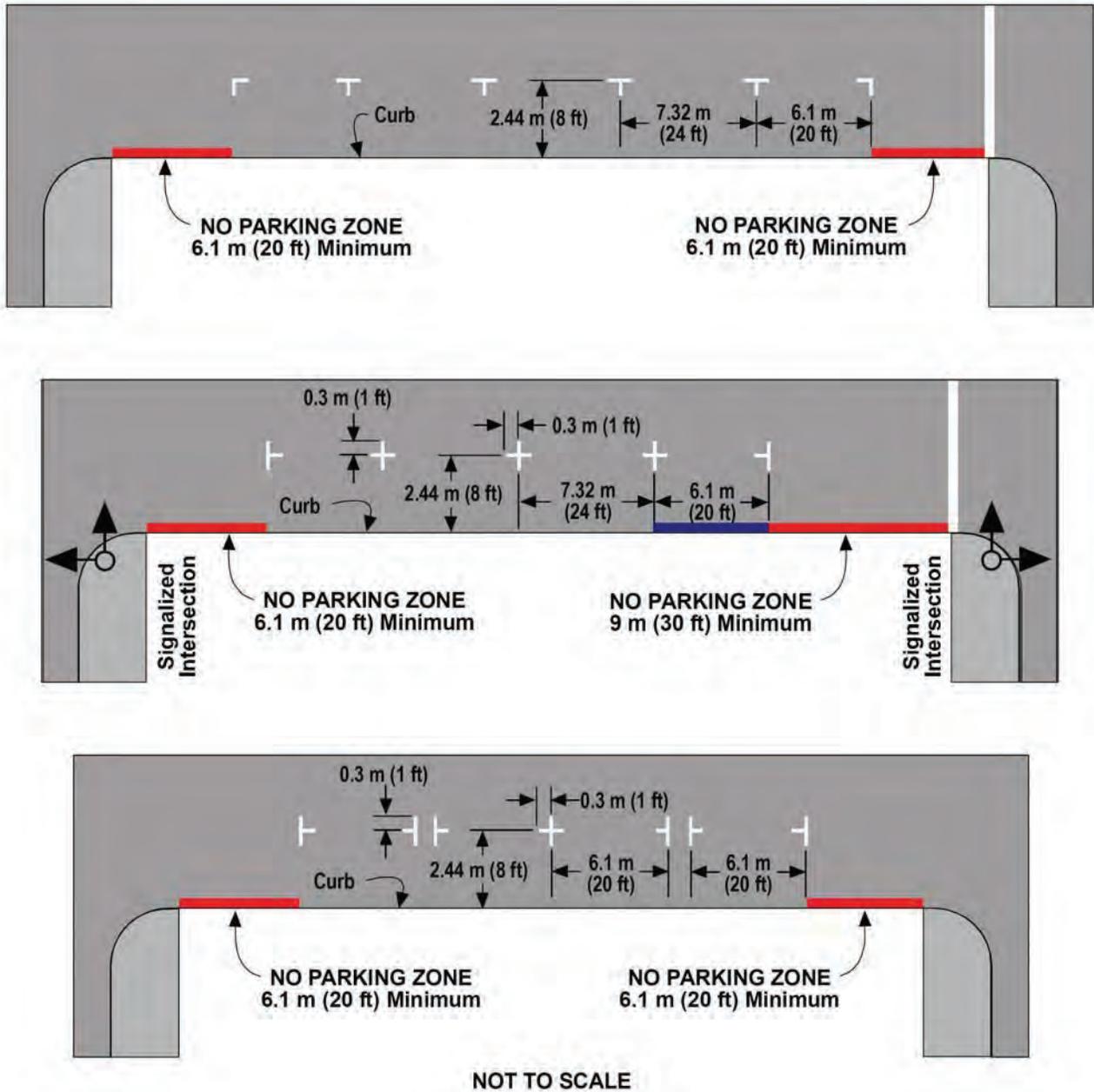


Figure 3B-18 (CA). Examples of Parking Space Markings



NOTES:

1. For Parking Stalls along the left side curb on one-way streets, markings may be placed on the curb delineating the ends of the individual stalls.
2. All stall markings are made with 100 mm (4 in) wide white lines. The shape is optional.
3. The parking stall cross line, 2.44 m (8 ft) from the curb, may be continuous longitudinally.

Figure 3B-19. International Symbol of Accessibility Parking Space Marking with Blue Background and White Border Options

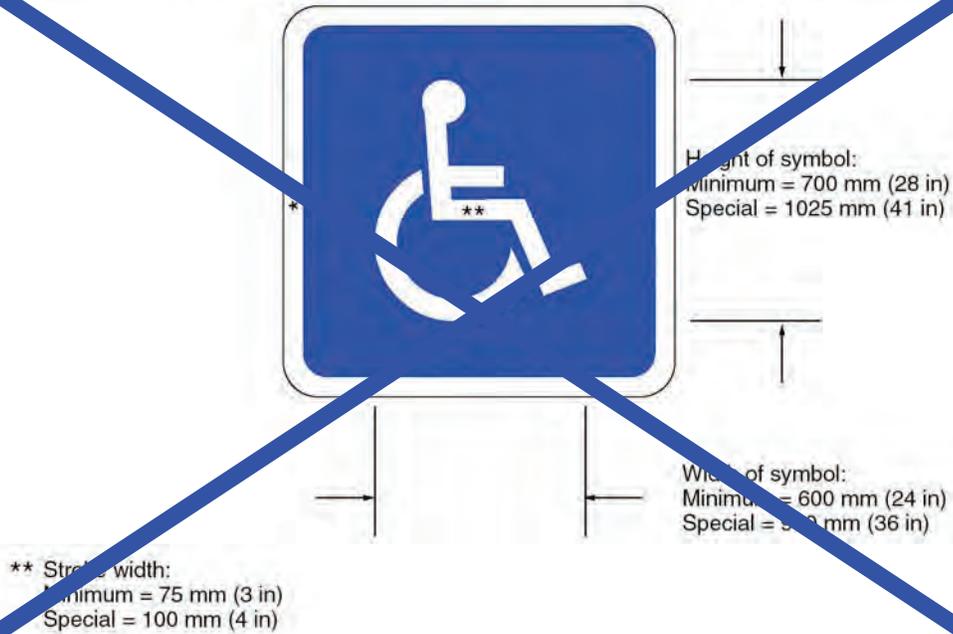


Figure 3B-20. Example of Elongated Letters for Word Pavement Markings

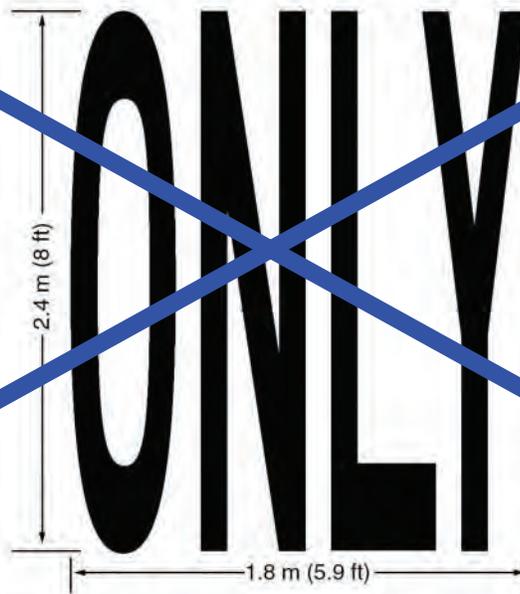
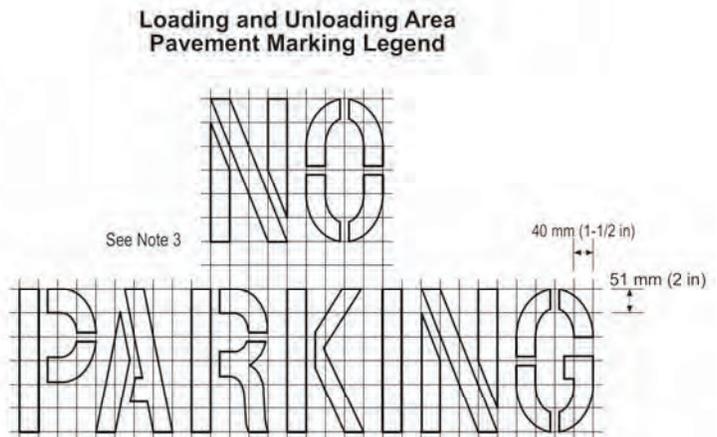
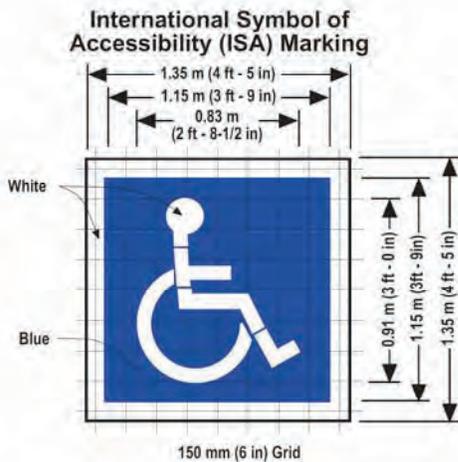
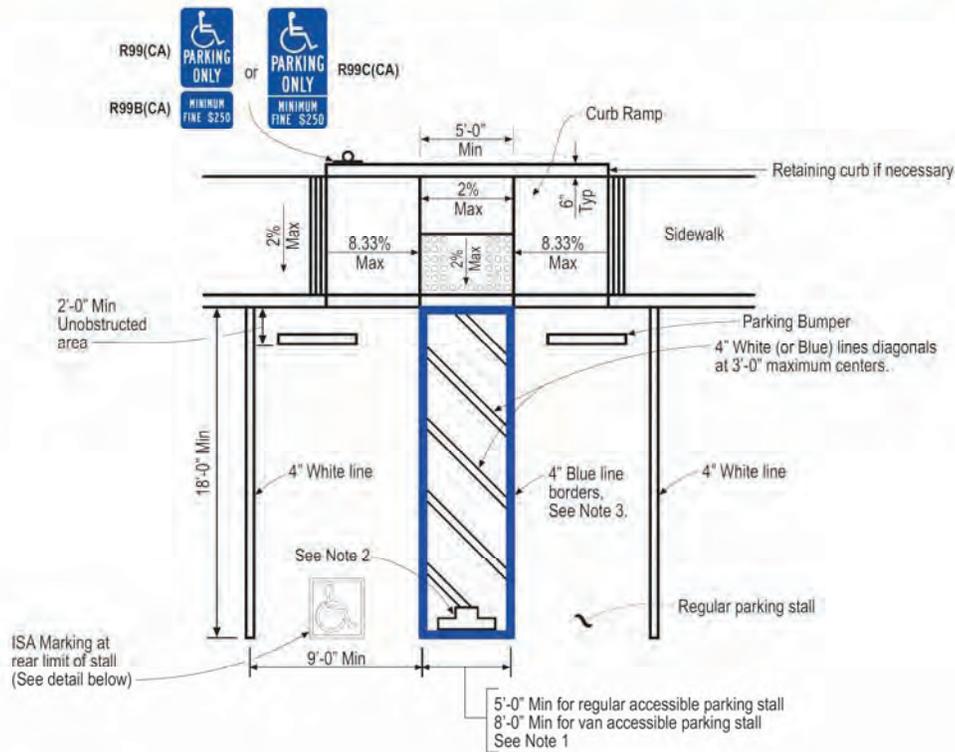


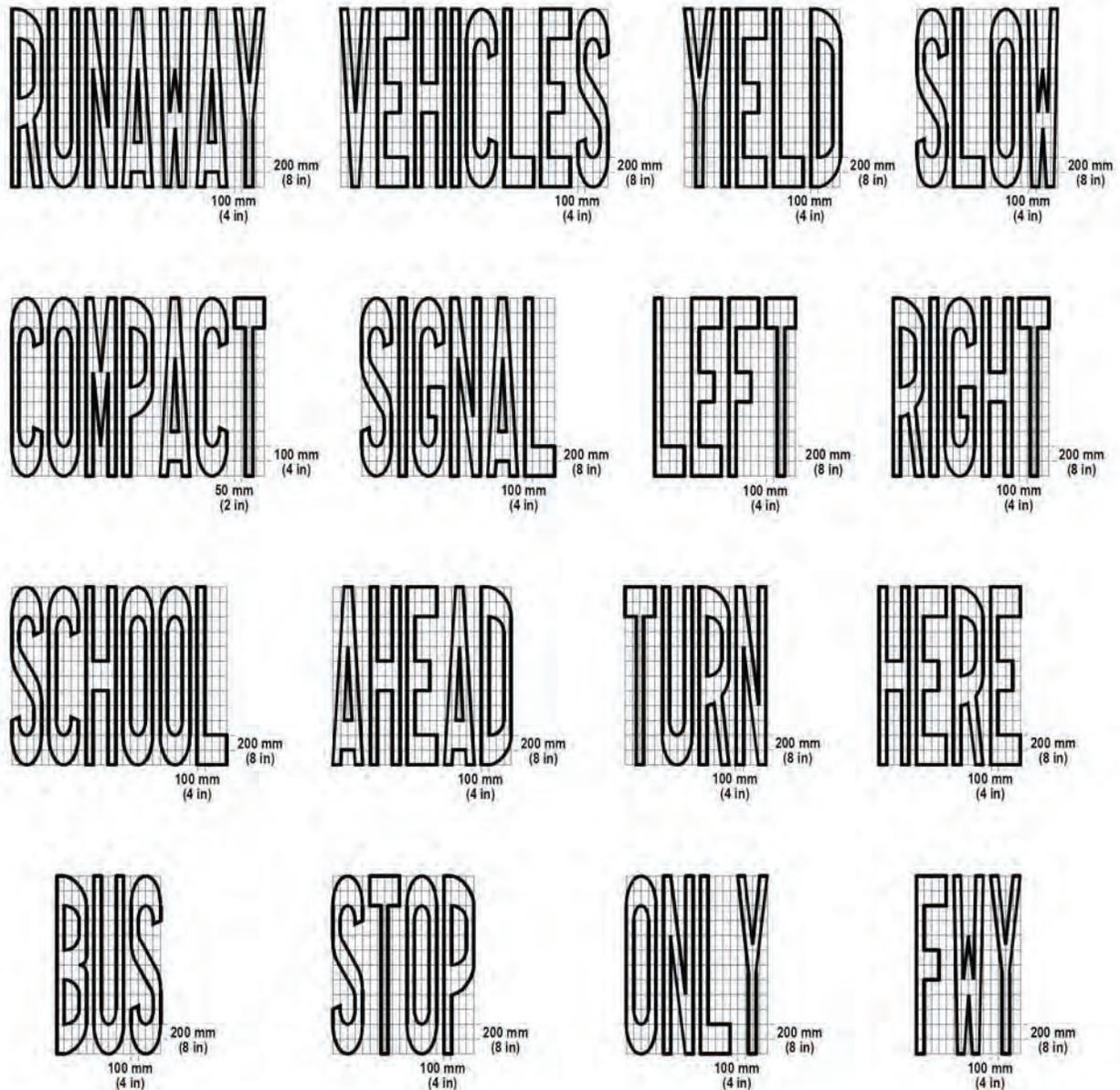
Figure 3B-19 (CA). Examples of Pavement Markings for Accessible Parking Spaces



NOTES:

1. The design details for this symbol, legends, and related markings are shown in the Department of Transportation's Standard Plans. See Standard Plan A24C for square unit area for painting the ISA parking space marking.
2. The words "NO PARKING" shall be painted in the loading and unloading area in white letters no less than 305 mm (12 in) high on a contrasting background and located so that it is visible to traffic enforcement officials. See Standard Plan A24E for square unit area for painting the legend "NO PARKING".
3. Loading and unloading area border shall be marked in blue paint. The border shall be painted blue and the hatched lines shall be painted a suitable contrasting color to the parking space. Blue or white paint is preferred.

Figure 3B-20 (CA). Examples of Elongated Letters for Word Pavement Markings (Sheet 1 of 2)

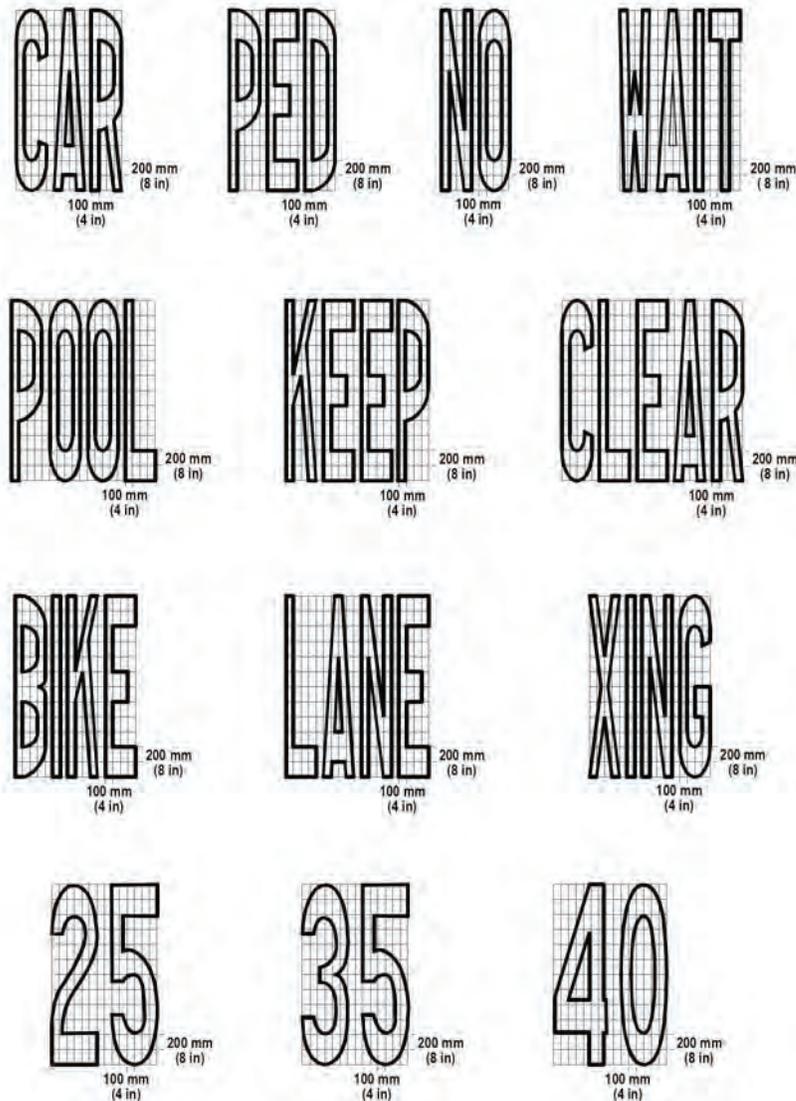


NOT TO SCALE

NOTES:

1. All letters and numerals should be in conformance with the standard alphabets for highway signs and pavement markings approved by Department of Transportation.
2. The design details for various words are also shown in Department of Transportation's Standard Plans.

Figure 3B-20 (CA). Examples of Elongated Letters for Word Pavement Markings (Sheet 2 of 2)



NOT TO SCALE

NOTES:

1. All letters and numerals should be in conformance with the standard alphabets for highway signs and pavement markings approved by Department of Transportation.
2. The design details for various words are also shown in Department of Transportation's Standard Plans.
3. Half-size "BIKE LANE" legends are shown on Figure 9C-6 (CA).

Figure 3B-21. Examples of Standard Arrows for Pavement Markings

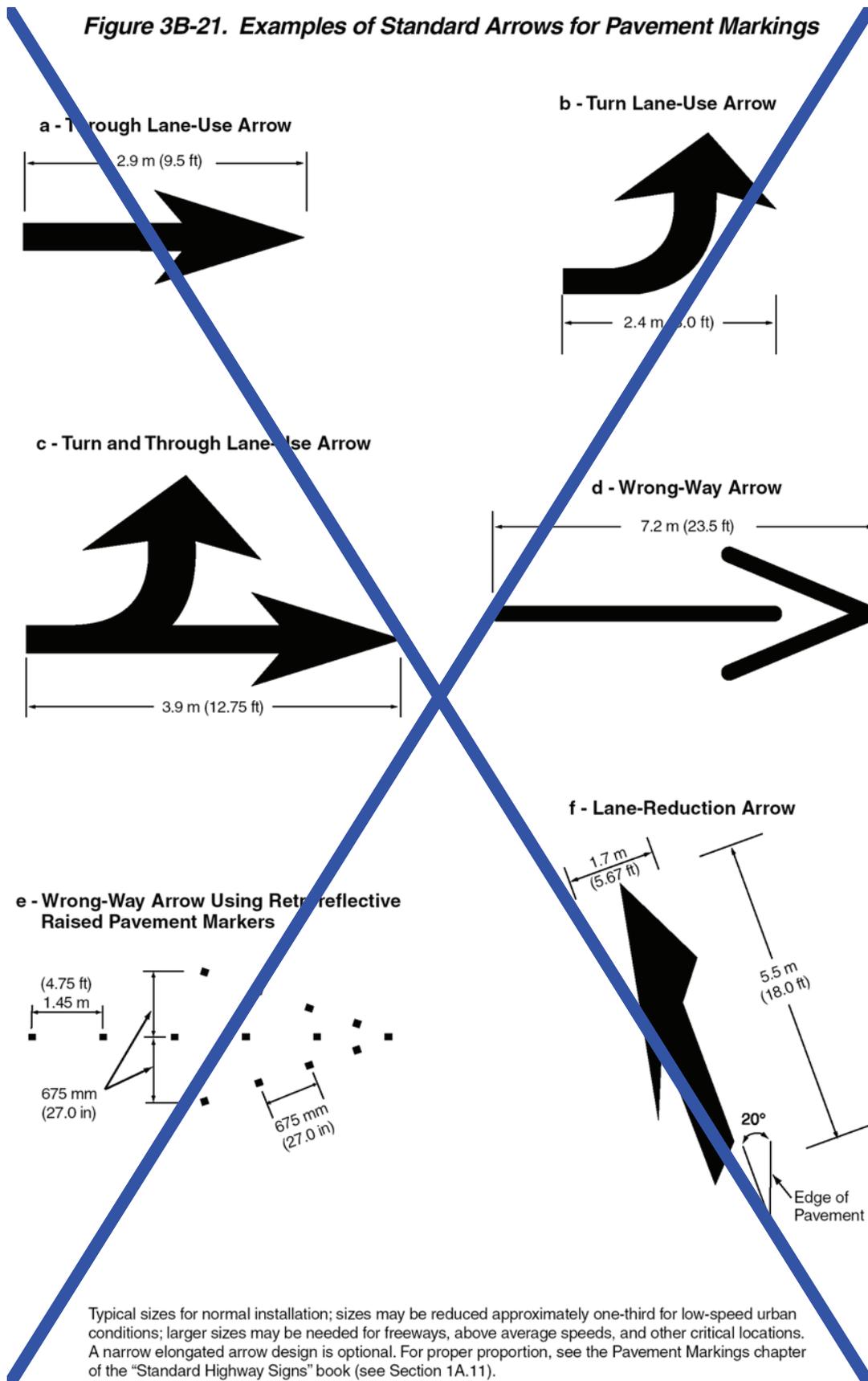
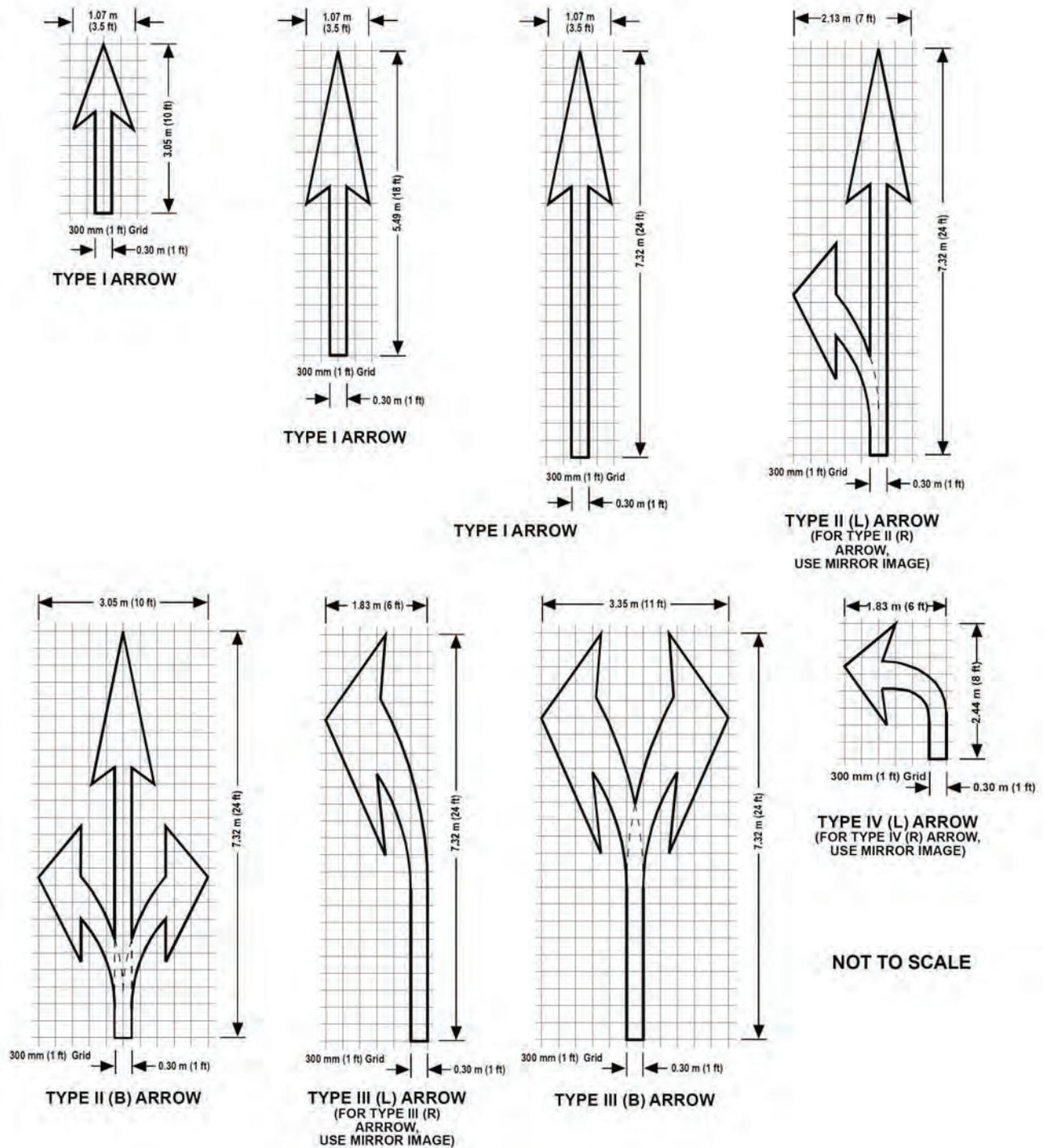
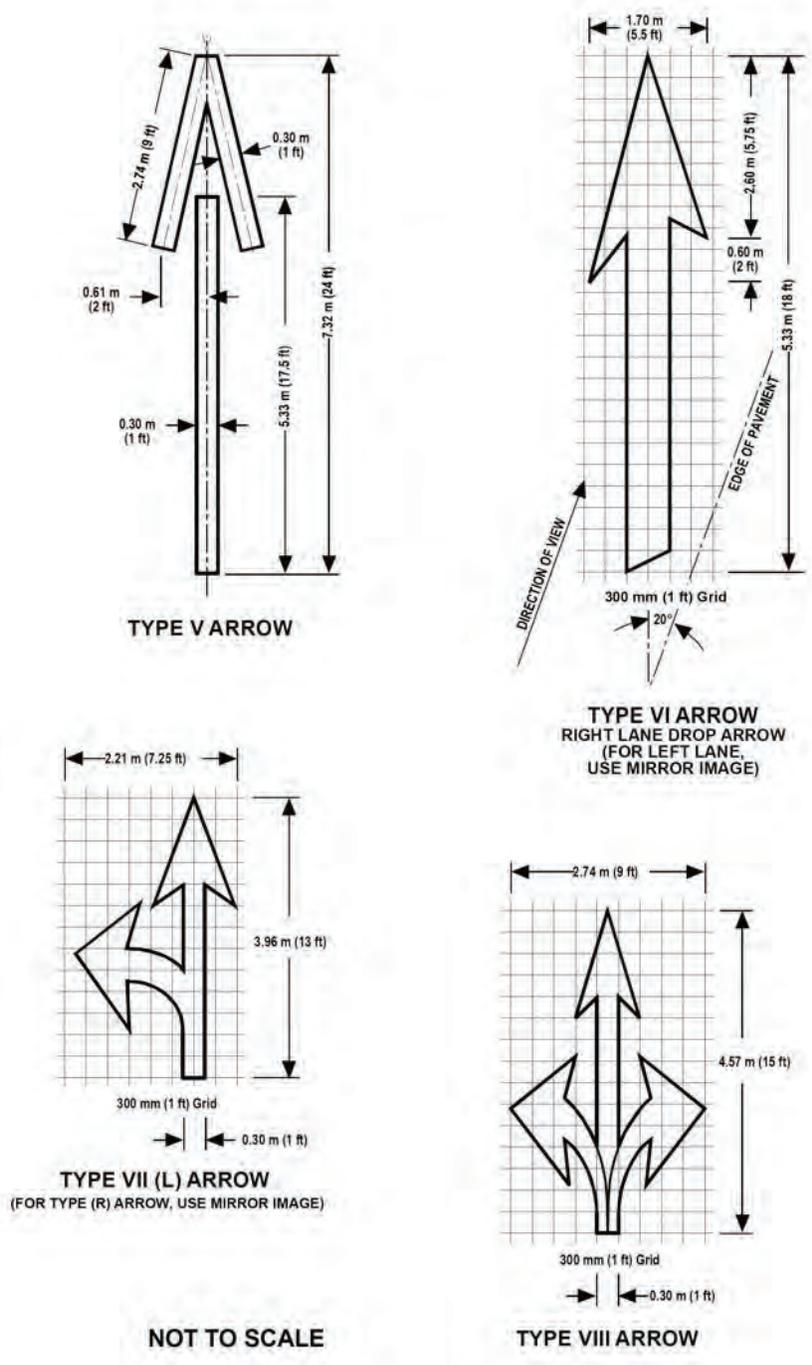


Figure 3B-21 (CA). Examples of Arrows for Pavement Markings (Sheet 1 of 2)



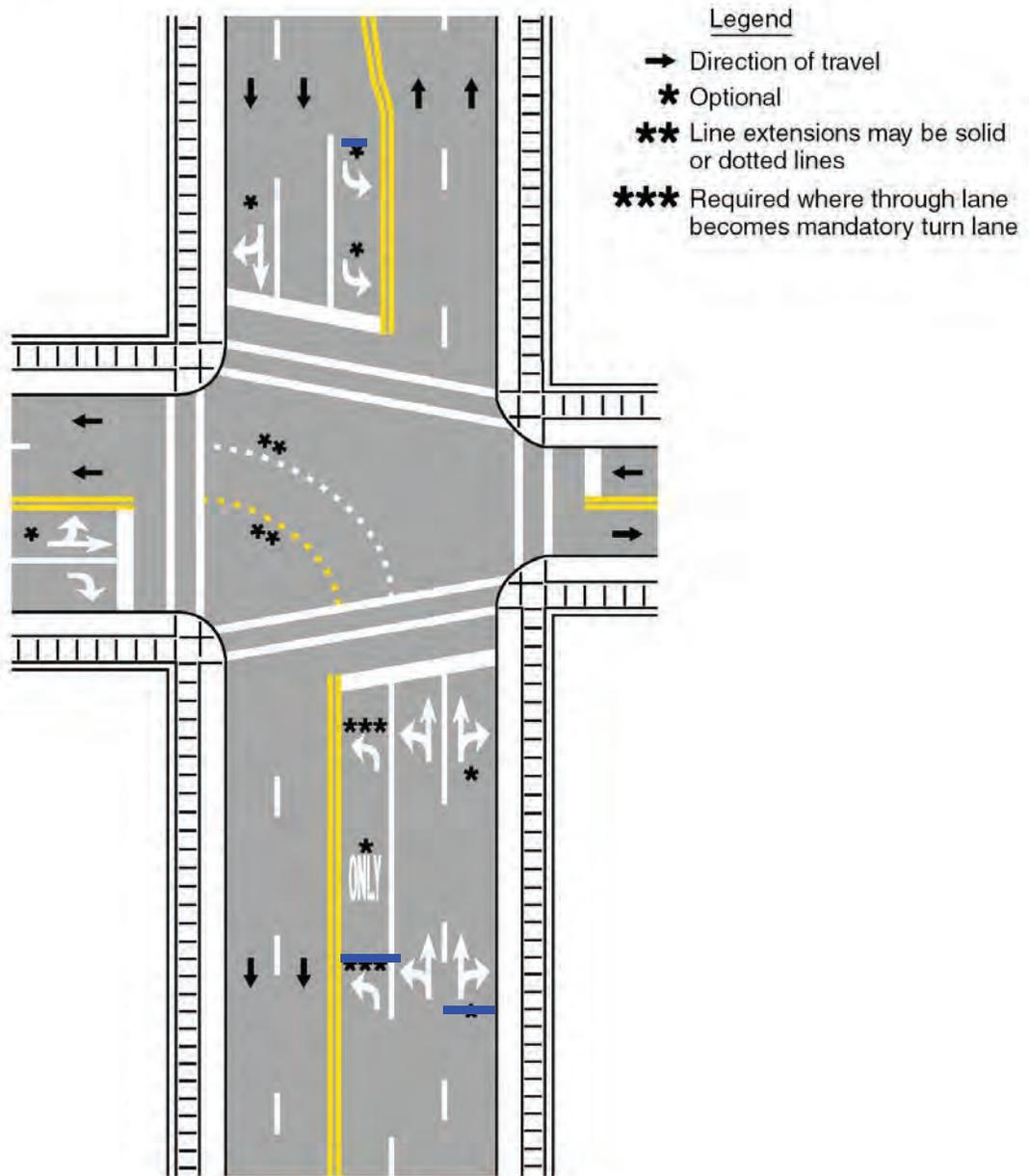
NOTE: The design details for various arrows are also shown in Department of Transportation's Standard Plans.

Figure 3B-21 (CA). Examples of Arrows for Pavement Markings (Sheet 2 of 2)



NOTE: The design details for various arrows are also shown in Department of Transportation's Standard Plans.

Figure 3B-22. Examples of Lane Use Control Word and Symbol Markings



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Figure 3B-23. Examples of Arrow Markings at Exit Ramp Terminals

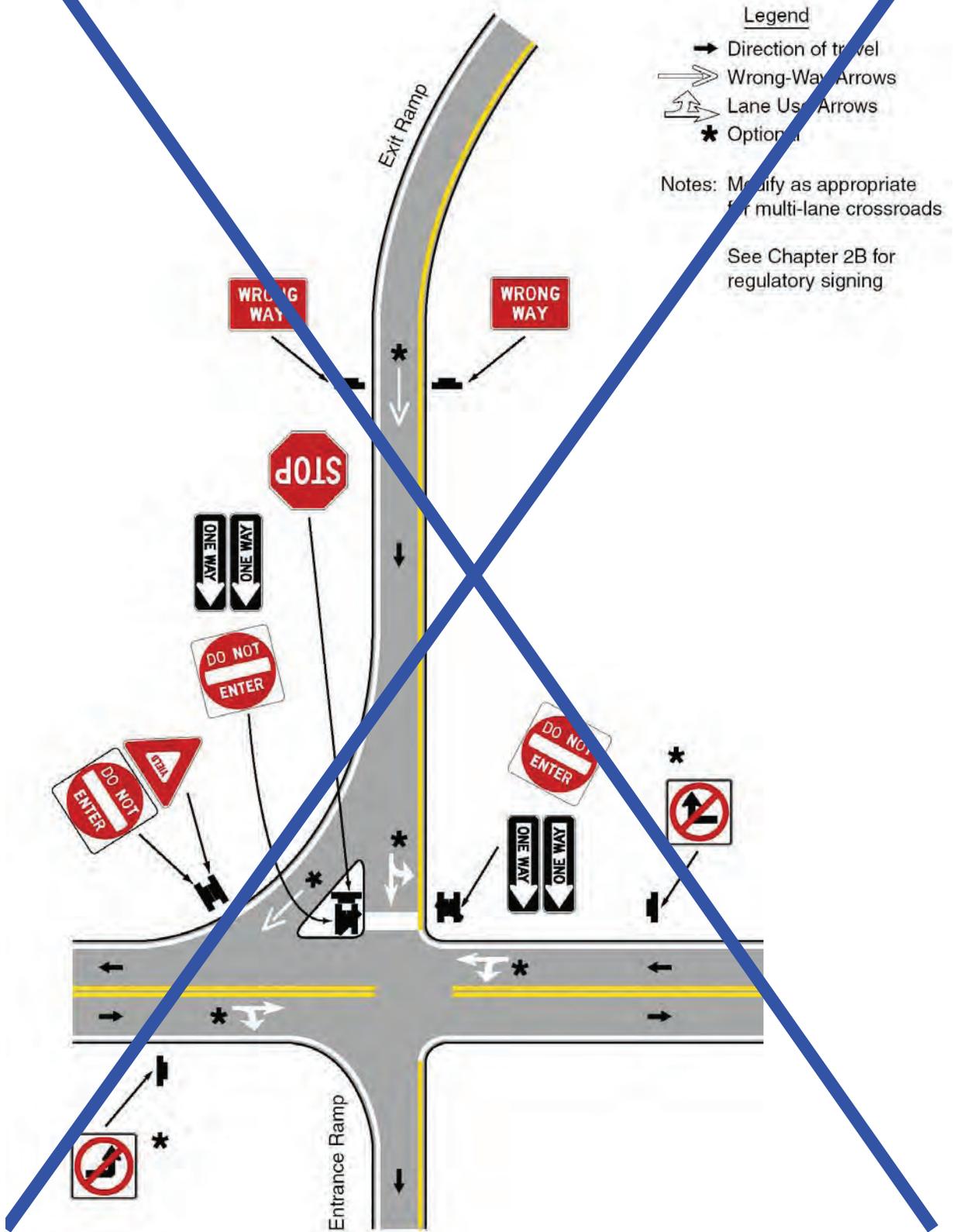
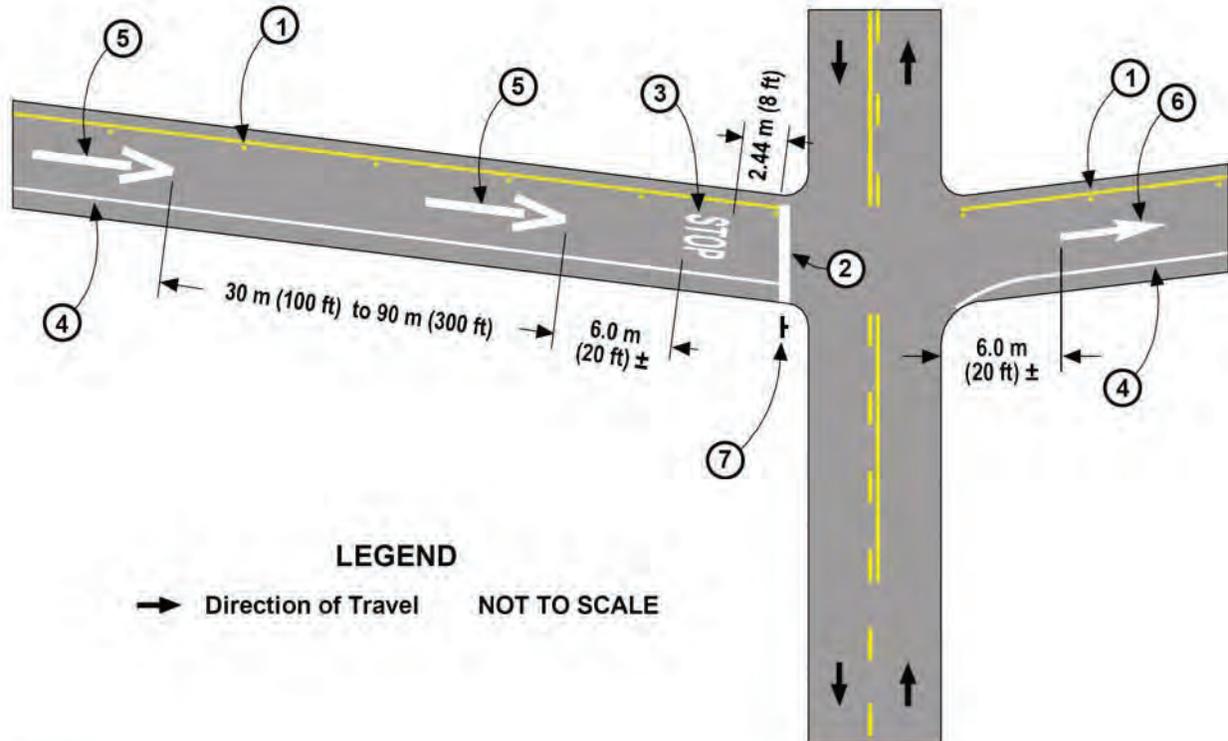


Figure 3B-23 (CA). Examples of Entrance/Exit Ramp Terminal Signs and Pavement Markings (Sheet 1 of 6)

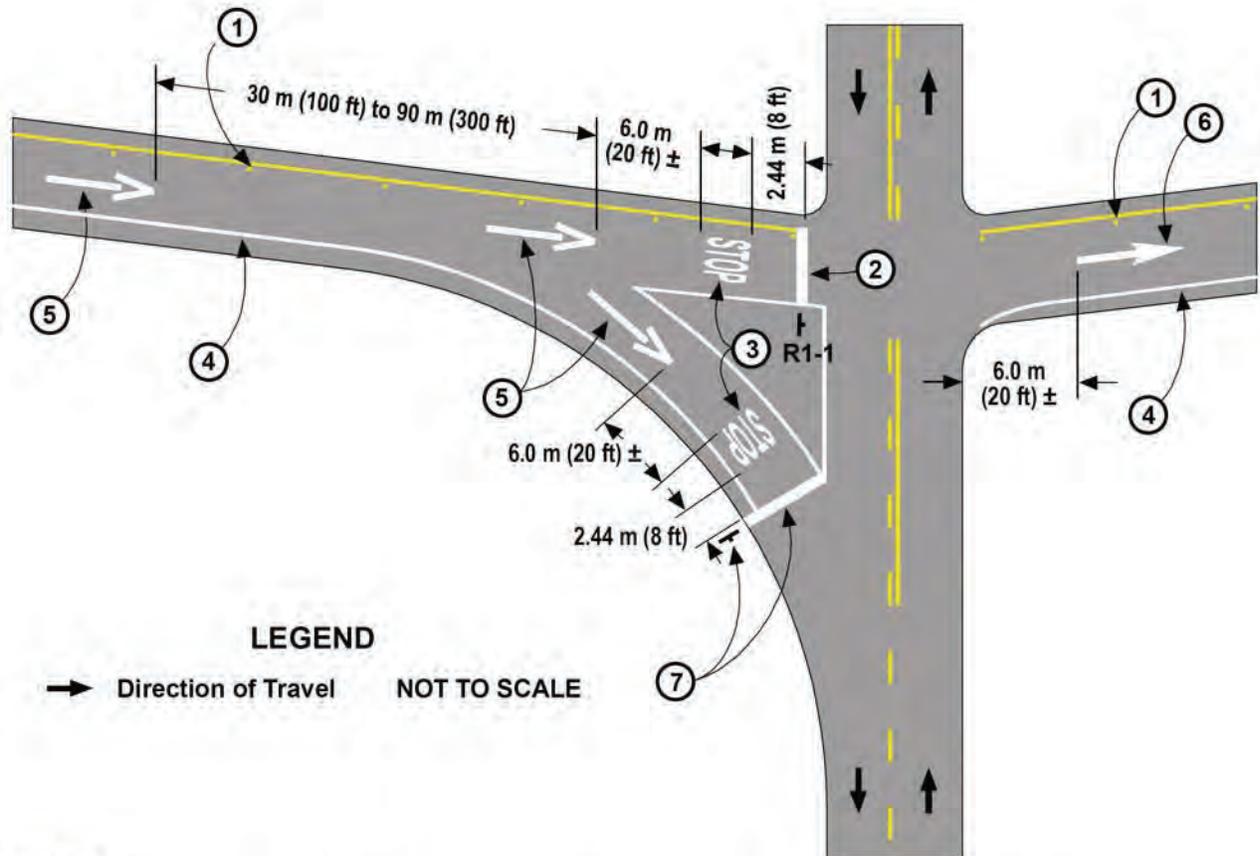


NOTES:

1. Place 100 mm (4 in) Solid Yellow Left Edge Line and One-Way Yellow Retroreflective Pavement Markers on 7.32 m (24 ft) centers as shown. See Edge Line Detail 25A.
2. Place Limit Line as shown. See also Note 7 and Section 3B.16.
3. Place "STOP" legend as shown. See Section 3B.16.
4. Place 100 mm (4 in) Solid White Right Edge Line, flared end optional, as shown. See Edge Line Detail 27B.
5. Place Type V Arrows, in pairs, as shown. See Section 3B.19.
6. Place Type I Arrow as shown. See Section 3B.19.
7. A "YIELD" (R1-2) sign, Yield Line and "YIELD" pavement legend may be used in lieu of the "STOP" (R1-1) sign, Limit Line and "STOP" pavement legend on low volume roads.

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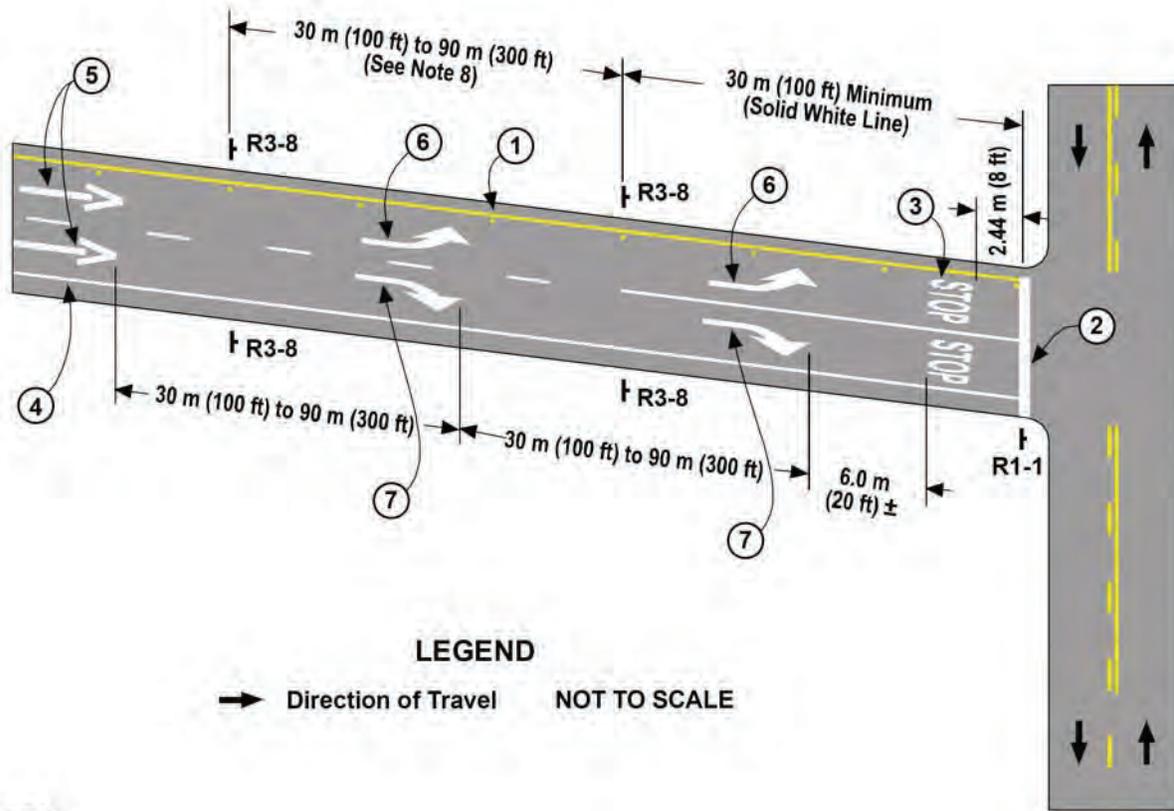
Figure 3B-23 (CA). Examples of Entrance/Exit Ramp Terminal Signs and Pavement Markings (Sheet 2 of 6)



NOTES:

1. Place 100 mm (4 in) Solid Yellow Left Edge Line and One-Way Yellow Retroreflective Pavement Markers on 7.32 m (24 ft) centers as shown. See Edge Line Detail 25A.
2. Place Limit Line as shown. See Section 3B.16.
3. Place "STOP" legend as shown. See Section 3B.16.
4. Place 100 mm (4 in) Solid White Right Edge Line, flared end optional, as shown. See Edge Line Detail 27B.
5. Place Type V Arrows, in pairs, as shown. See Section 3B.19.
6. Place Type I Arrow as shown. See Section 3B.19.
7. A "YIELD" (R1-2) sign, Yield Line and "YIELD" pavement legend may be used in lieu of the "STOP" (R1-1) sign, Limit Line and "STOP" pavement legend on low volume roads.

Figure 3B-23 (CA). Examples of Entrance/Exit Ramp Terminal Signs and Pavement Markings (Sheet 3 of 6)



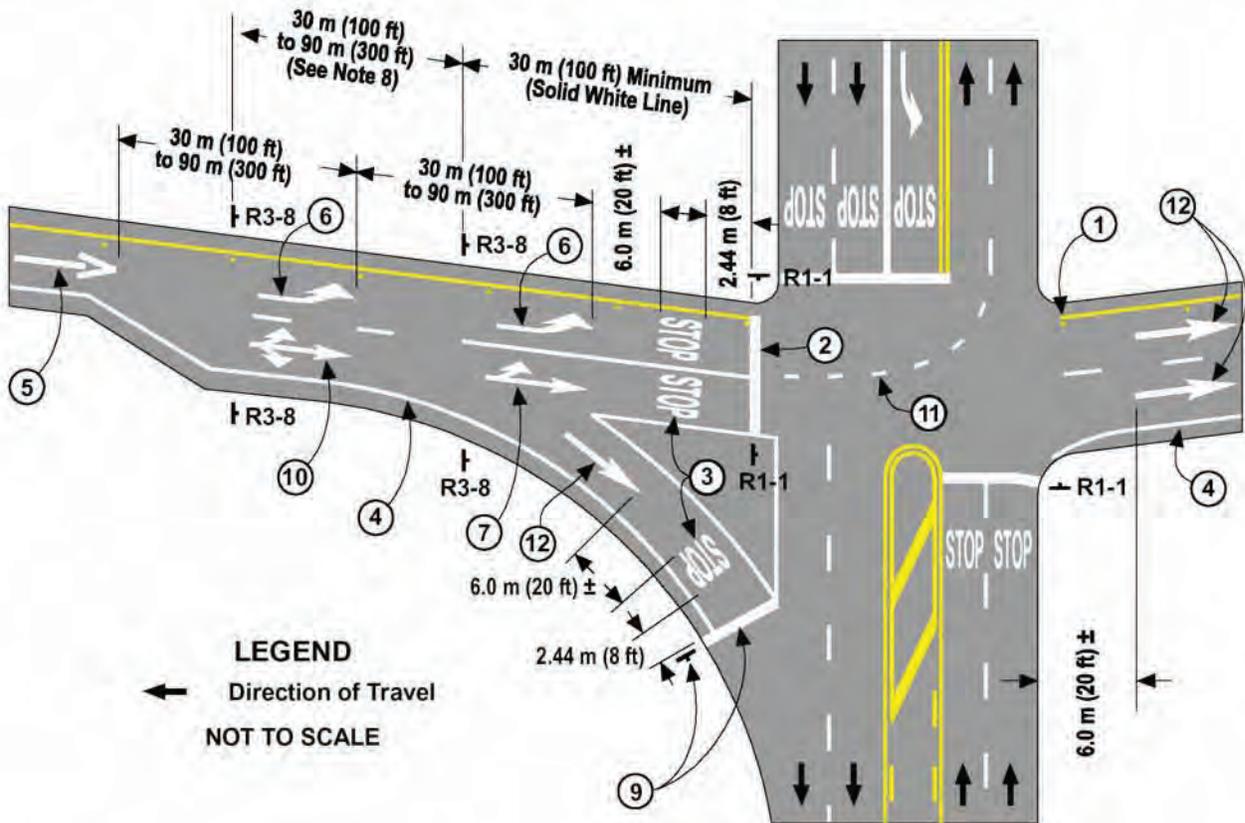
LEGEND

➔ Direction of Travel NOT TO SCALE

NOTES:

1. Place 100 mm (4 in) Solid Yellow Left Edge Line and One-Way Yellow Retroreflective Pavement Markers on 7.32 m (24 ft) centers as shown. See Edge Line Detail 25A.
2. Place Limit Line as shown. See Section 3B.16.
3. Place "STOP" legend as shown. See Section 3B.16.
4. Place 100 mm (4 in) Solid White Right Edge Line, flared end optional, as shown. See Edge Line Detail 27B.
5. Place Type V Arrows as shown. See Section 3B.19.
6. Place Type III (L) Arrows, in pairs, as shown when distance permits. See Section 3B.19.
7. Place Type III (R) Arrows, in pairs, as shown when distance permits. See Section 3B.19.
8. Lane Use Control (R3-8) signs should be placed on both sides of the exit ramp, at the beginning of the Solid White Line. An additional set should also be placed in advance where distance permits, to alert the motorist of lane use controls ahead.

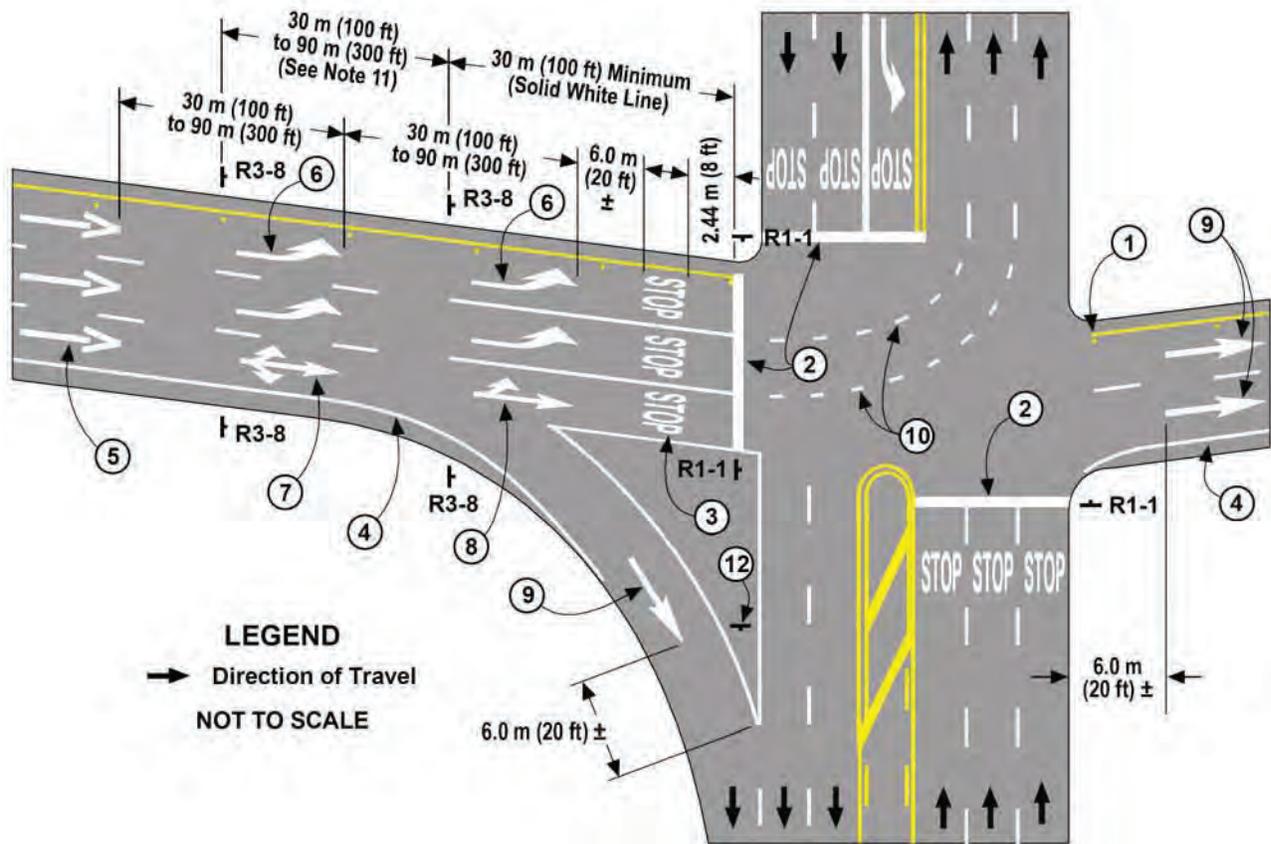
Figure 3B-23 (CA). Examples of Entrance/Exit Ramp Terminal Signs and Pavement Markings (Sheet 4 of 6)



NOTES:

1. Place 100 mm (4 in) Solid Yellow Left Edge Line and One-Way Yellow Retroreflective Pavement Markers on 7.32 m (24 ft) centers as shown. See Edge Line Detail 25A.
2. Place Limit Line as shown. See Section 3B.16.
3. Place "STOP" legend as shown. See Section 3B.16.
4. Place 100 mm (4 in) Solid White Right Edge Line, flared end optional, as shown. See Edge Line Detail 27B.
5. Place Type V Arrow as shown. See Section 3B.19.
6. Place Type III(L) Arrows, in pairs, as shown where distance permits. See Section 3B.19.
7. Place Type II(L) Arrow, as shown where distance permits. See Section 3B.19.
8. Lane-Use Control (R3-8) signs should be placed on both sides of the exit ramp, at the beginning of the Solid White Line. An additional set should also be placed in advance where distance permits, to alert the motorist of lane use controls ahead.
9. A "YIELD" (R1-2) sign, Yield Line and "YIELD" pavement legend may be used in lieu of the "STOP" (R1-1) sign, Limit Line and "STOP" pavement legend on low volume roads.
10. Place Type II(B) Arrow, as shown. See Section 3B.19.
11. Lane Line Extensions through the intersection may be used, as shown. See Lane Line Detail 40.
12. Place Type I [7.32 m (24 ft)] Arrows as shown. See Section 3B.19.

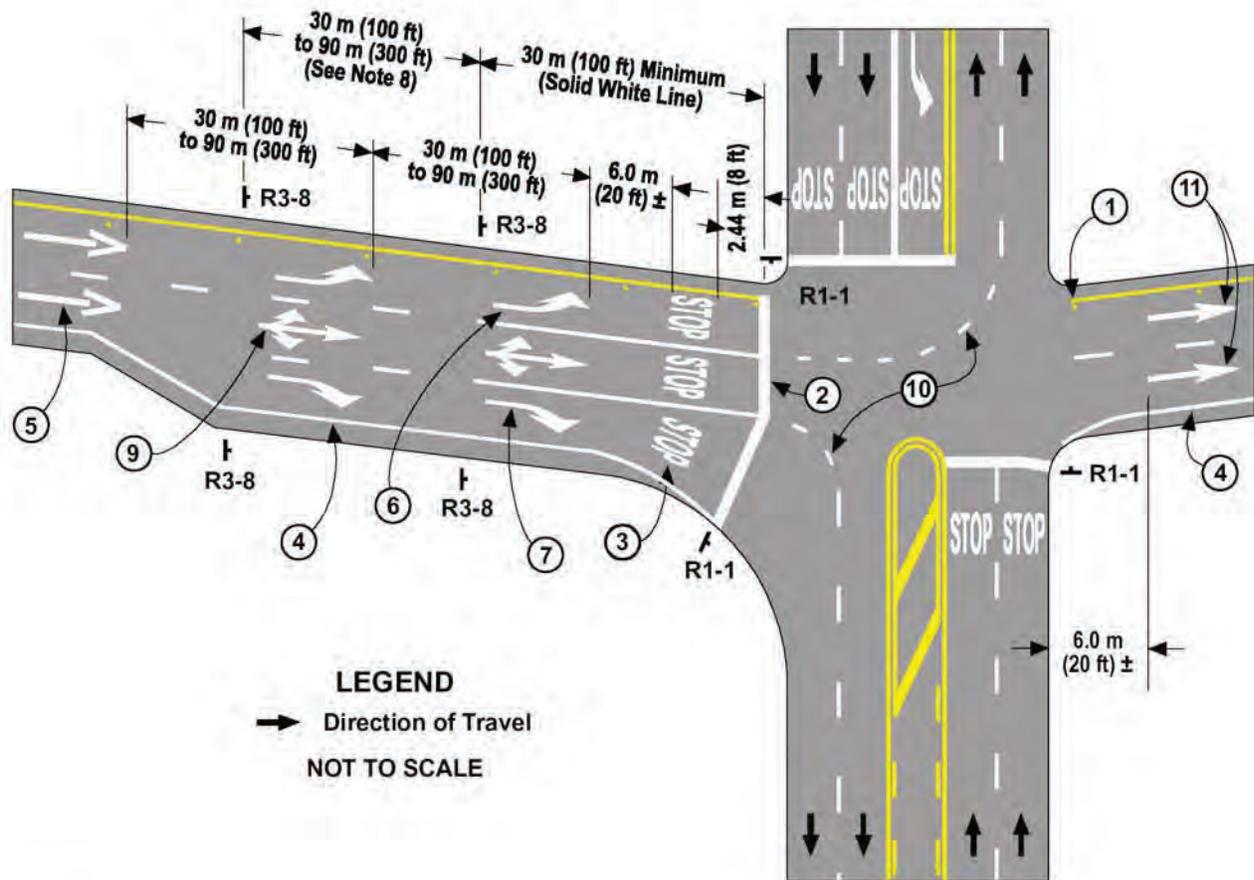
Figure 3B-23 (CA). Examples of Entrance/Exit Ramp Terminal Signs and Pavement Markings (Sheet 5 of 6)



NOTES:

1. Place 100 mm (4 in) Solid Yellow Left Edge Line and One-Way Yellow Retroreflective Pavement Markers on 7.32 m (24 ft) centers as shown. See Edge Line Detail 25A.
2. Place Limit Line as shown. See Section 3B.16.
3. Place "STOP" legend as shown. See Section 3B.16.
4. Place 100 mm (4 in) Solid White Right Edge Line, flared end optional, as shown. See Edge Line Detail 27B.
5. Place Type V Arrows as shown. See Section 3B.19.
6. Place Type III(L) Arrows, in pairs, as shown where distance permits. See Section 3B.19.
7. Place Type II(B) Arrow, as shown where distance permits. See Section 3B.19.
8. Place Type II(L) Arrow, as shown. See Section 3B.19.
9. Place Type I [7.32 m (24 ft)] Arrow as shown. See Section 3B.19.
10. Lane Line Extensions through the intersection may be used, as shown. See Lane Line Detail 40.
11. Lane-Use Control (R3-8) signs should be placed on both sides of the exit ramp, at the beginning of the Solid White Line. An additional set should also be placed in advance where distance permits, to alert the motorist of lane use controls ahead.
12. The Added Lane Symbol (W4-3) sign should be used in lieu of the Merge Symbol (W4-1) sign, when an extra lane is provided of more than 0.8 km (1/2 Mile) in length.

Figure 3B-23 (CA). Examples of Entrance/Exit Ramp Terminal Signs and Pavement Markings (Sheet 6 of 6)



NOTES:

1. Place 100 mm (4 in) Solid Yellow Left Edge Line and One-Way Yellow Retroreflective Pavement Markers on 7.32 m (24 ft) centers as shown. See Edge Line Detail 25A.
2. Place Limit Line as shown. See Section 3B.16.
3. Place "STOP" legend as shown. See Section 3B.16.
4. Place 100 mm (4 in) Solid White Right Edge Line, flared end optional, as shown. See Edge Line Detail 27B.
5. Place Type V Arrows as shown. See Section 3B.19.
6. Place Type III(L) Arrows, in pairs, as shown where distance permits. See Section 3B.19.
7. Place Type III(R) Arrows, in pairs, as shown where distance permits. See Section 3B.19.
8. Lane-Use Control (R3-8) signs should be placed on both sides of the exit ramp, at the beginning of the Solid White Line. An additional set should also be placed in advance where distance permits, to alert the motorist of lane use controls ahead.
9. Place Type II(B) Arrows, in pairs, as shown where distance permits. See Section 3B.19.
10. Lane Line Extensions through the intersection may be used, as shown. See Lane Line Detail 40.
11. Place Type I [7.32 m (24 ft)] Arrows as shown. See Section 3B.19.

Figure 3B-24. Examples of Arrow Markings at Entrance Ramp Terminals

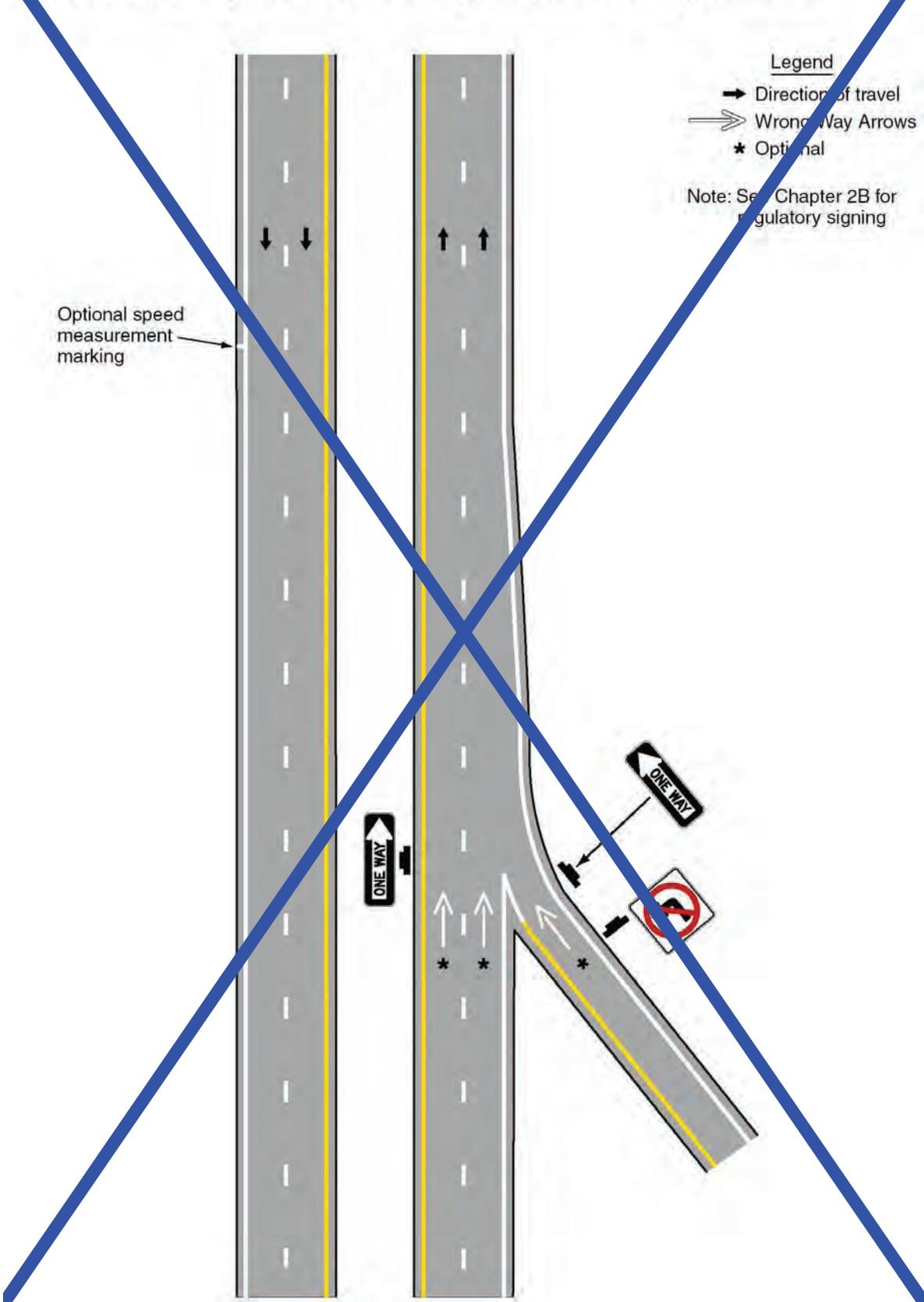
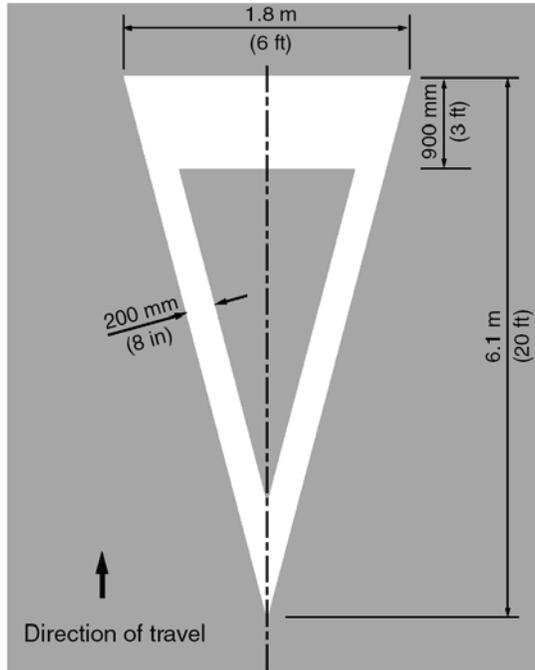


Figure 3B-25. Yield Ahead Triangle Symbols

a - Posted or Statutory Speed Limit 70 km/h (45 mph) or greater



b - Posted or Statutory Speed Limit less than 70 km/h (45 mph)

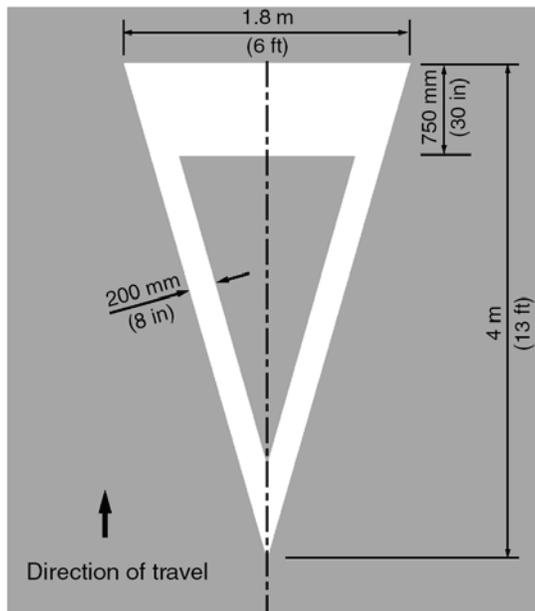
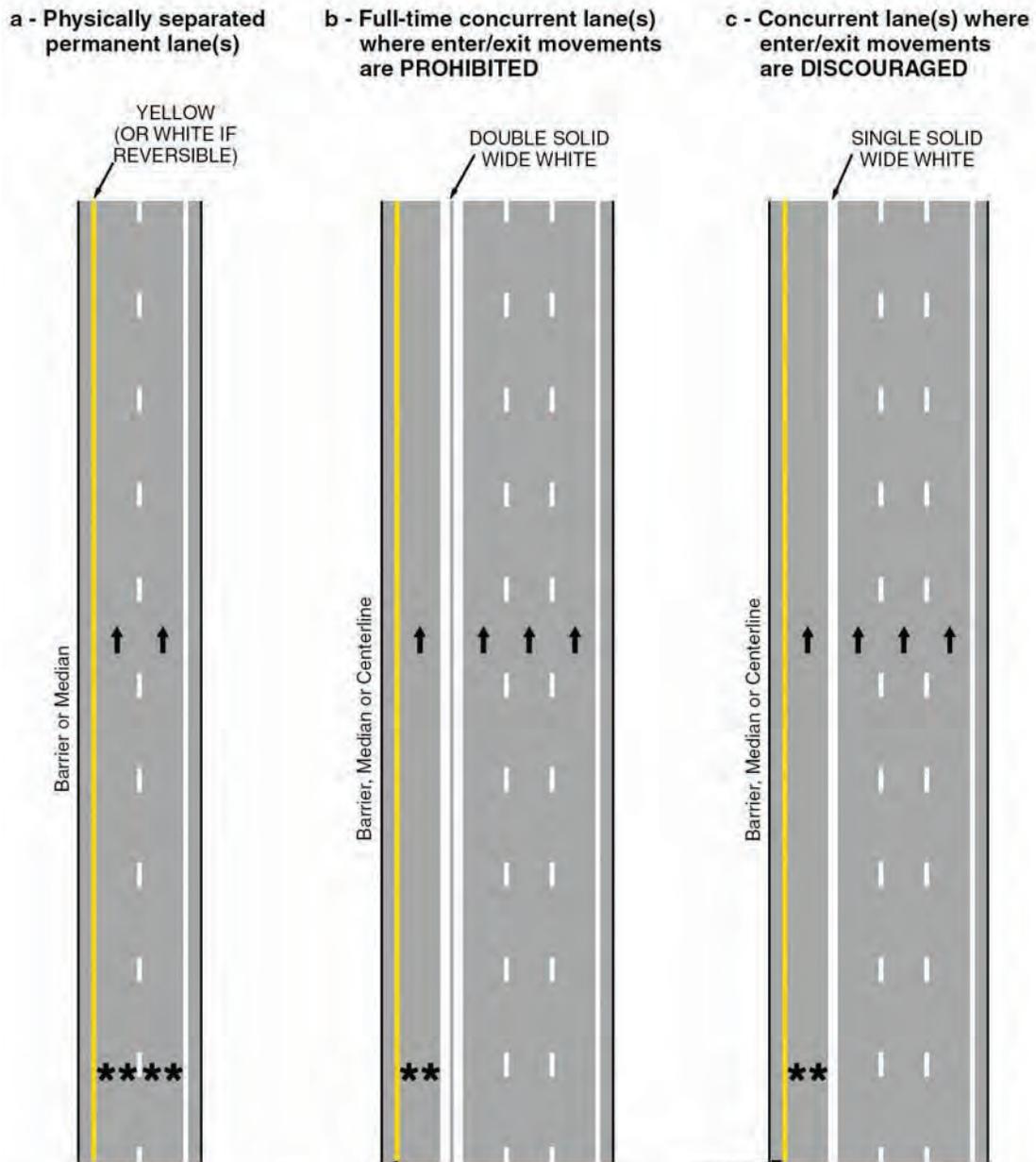


Figure 3B-26. Examples of Markings for Preferential Lanes
 (Sheet 1 of 2)



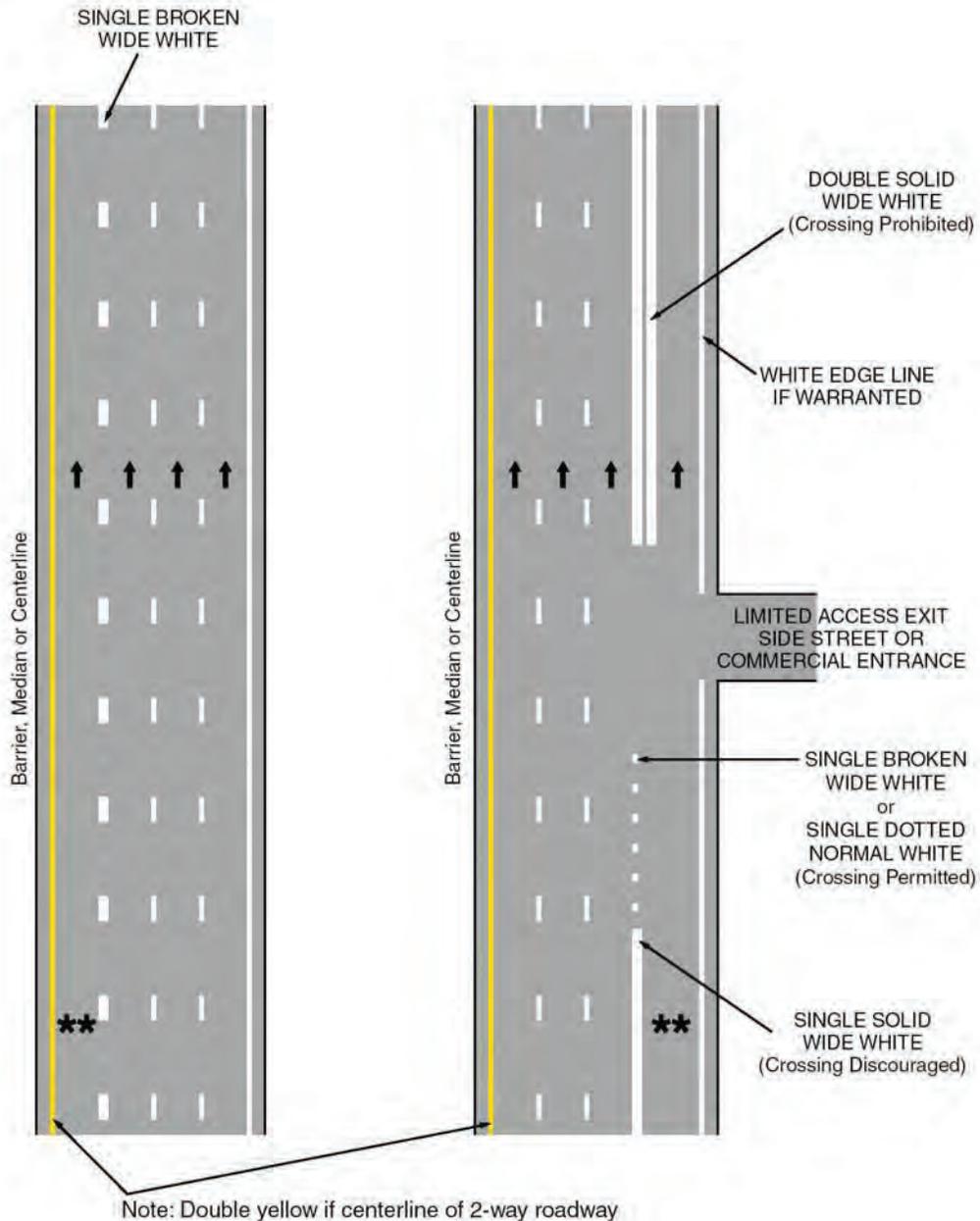
Note: Double yellow if centerline of 2-way roadway

- Legend
- Direction of travel
 - *** Applicable symbol or word

Figure 3B-26. Examples of Markings for Preferential Lanes
 (Sheet 2 of 2)

**d - Full-time concurrent lane(s)
 where enter/exit movements
 are PERMITTED**

e - Right Side Concurrent Lane(s)



- Legend**
- Direction of travel
 - ** Applicable symbol or word

Figure 3B-27. Examples of Markings for Roundabout Intersections with One-Lane Approaches

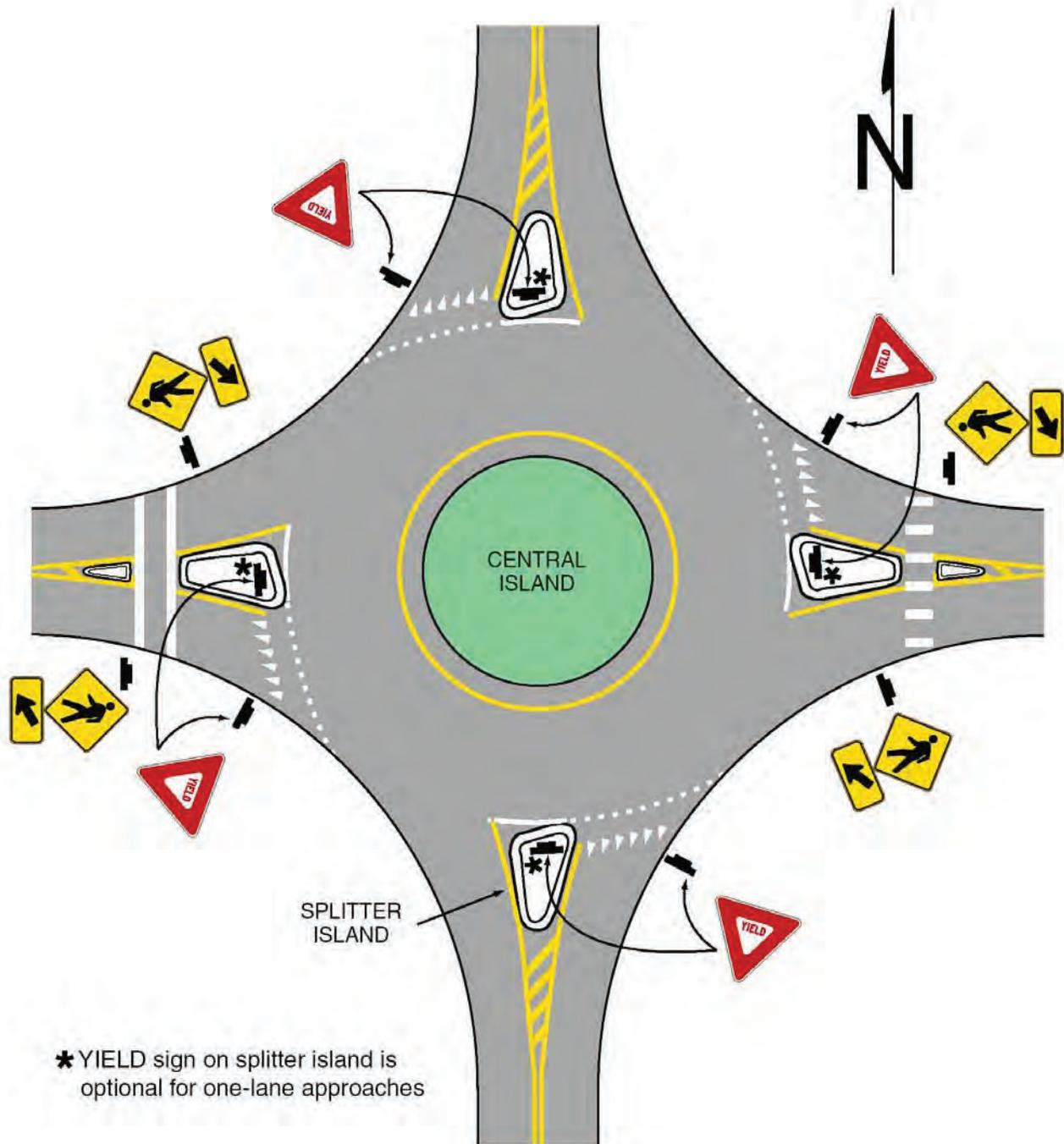


Figure 3B-28. Examples of Markings for Roundabout Intersections with Two-Lane Approaches

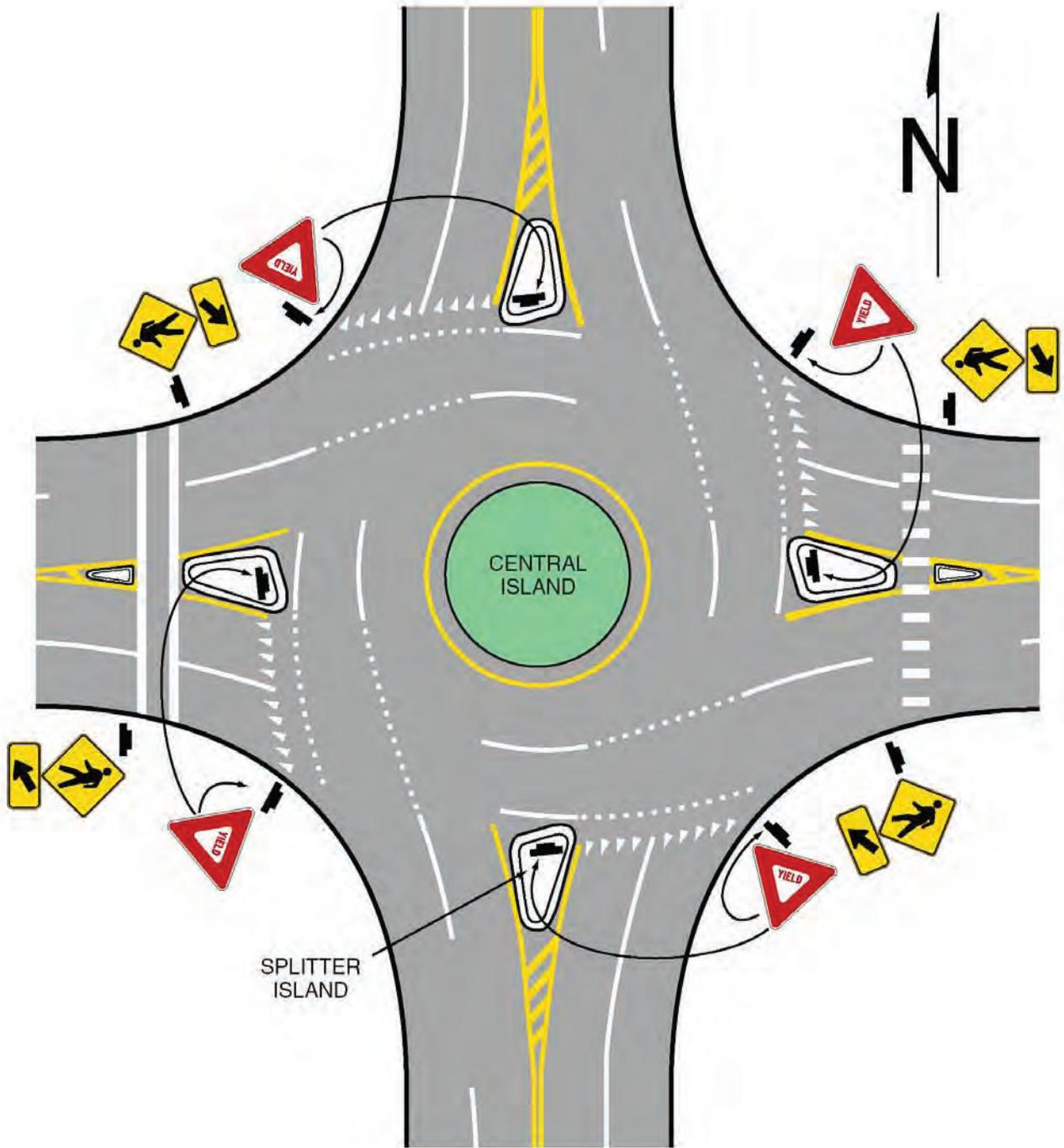


Figure 3B-29. Examples of Pavement Markings for Speed Humps Without Crosswalks

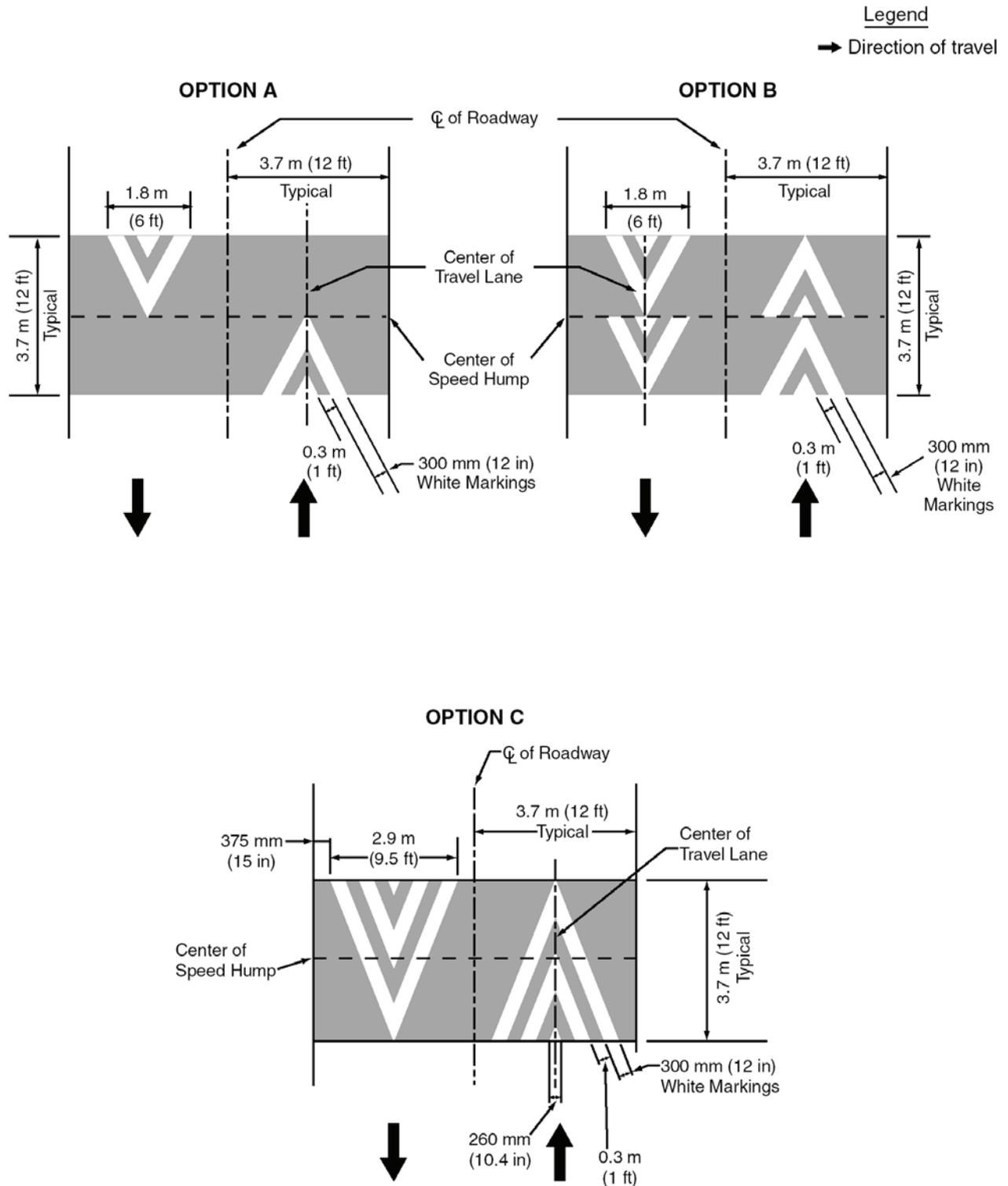
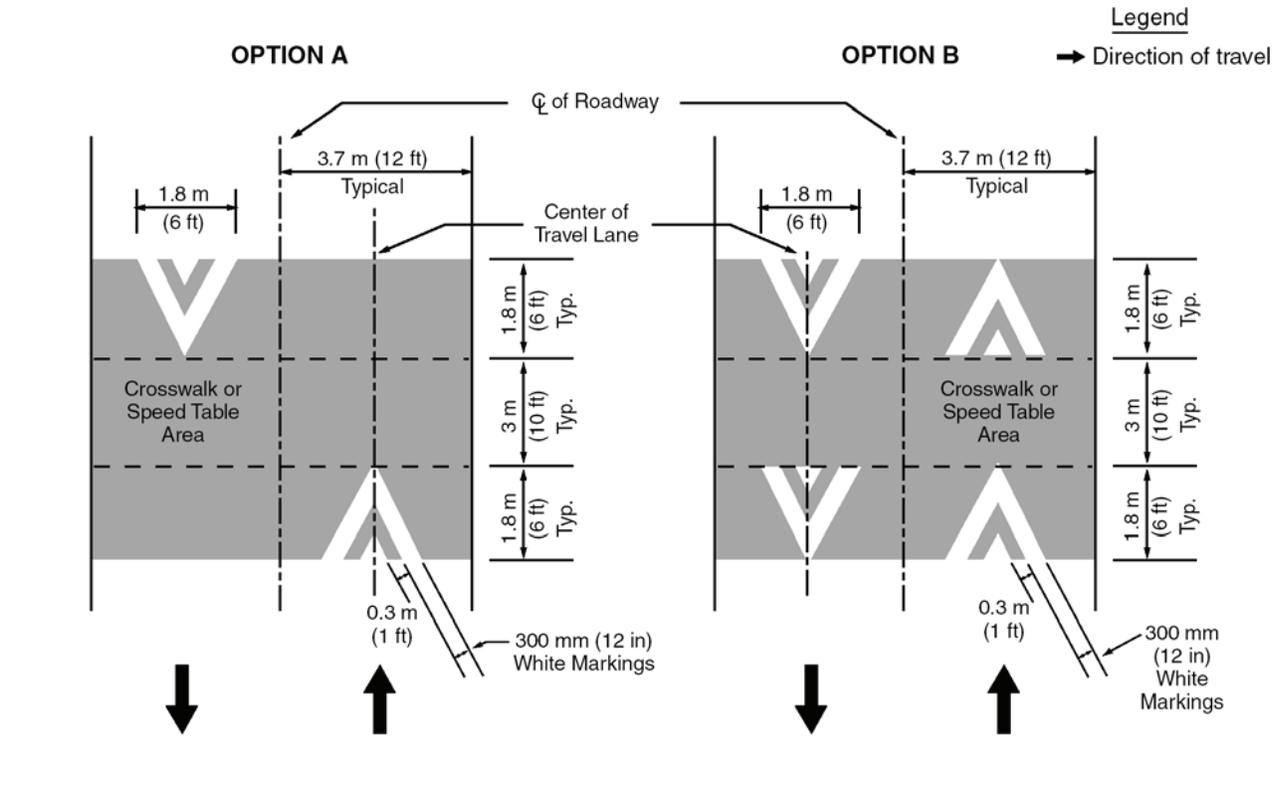


Figure 3B-30. Examples of Pavement Markings for Speed Tables or Speed Humps with Crosswalks



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Figure 3B-31. Examples of Advance Warning Markings for Speed Humps

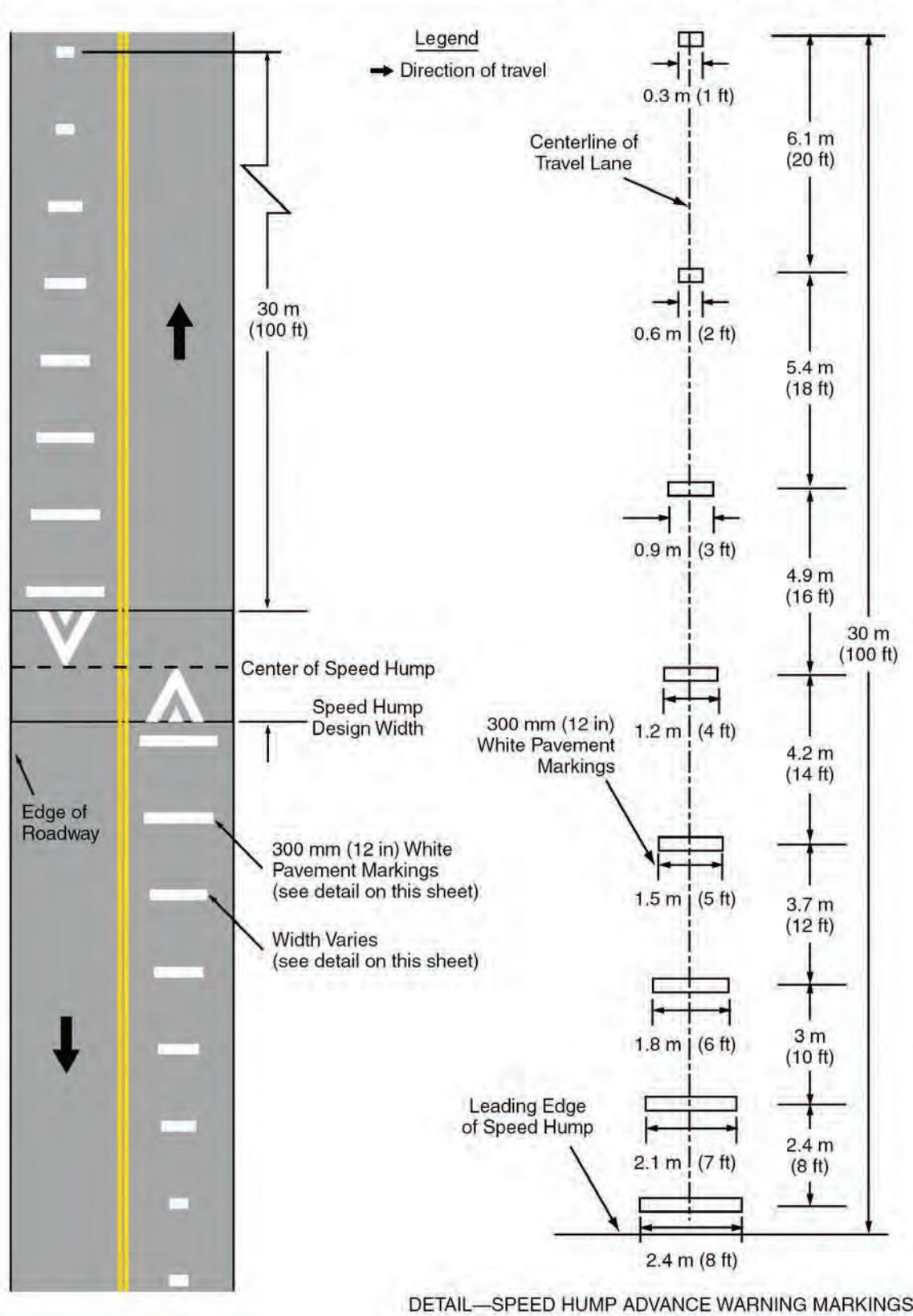
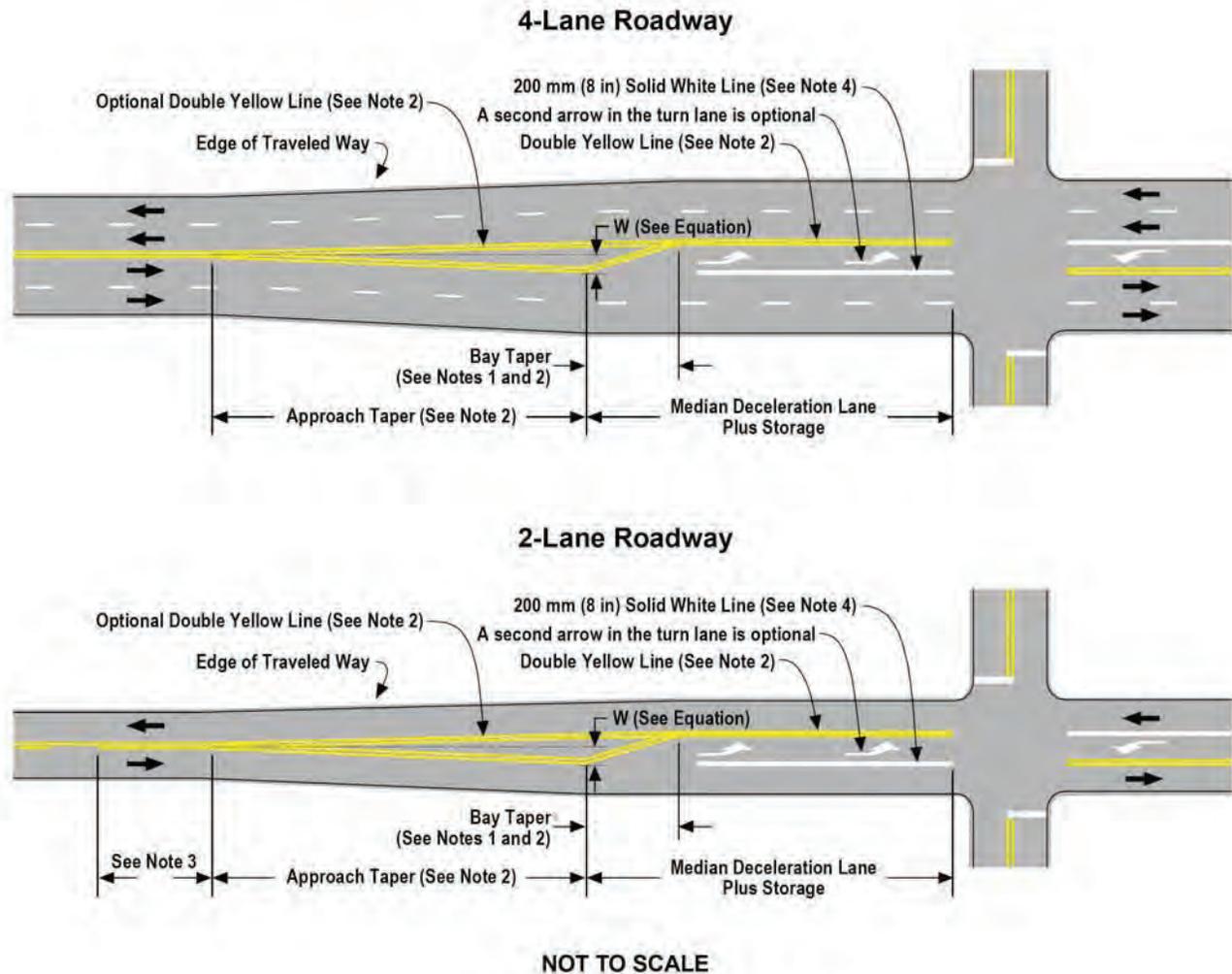


Figure 3B-101 (CA). Examples of Left-Turn Channelization Markings



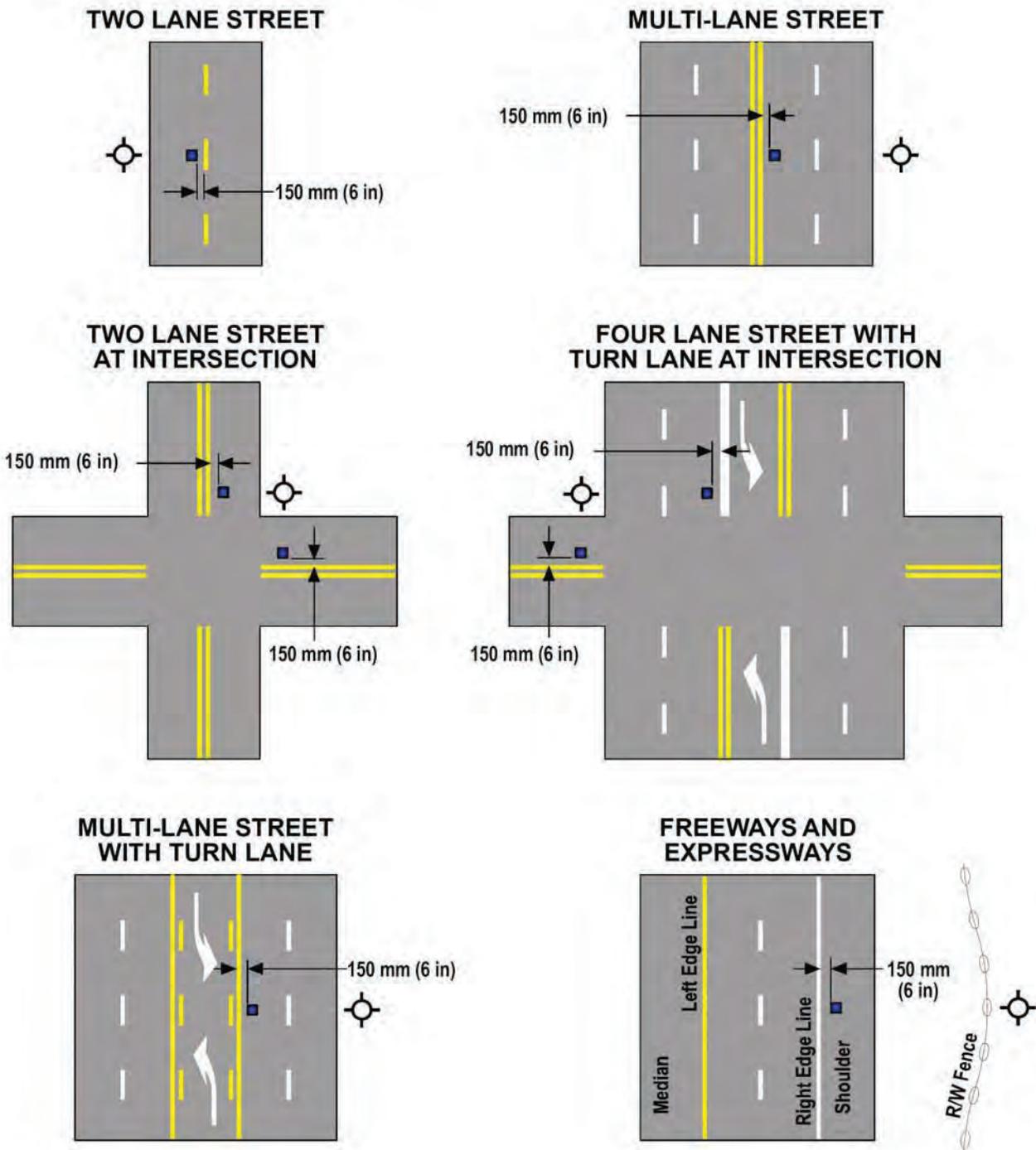
$$\text{Approach Taper} = \frac{WS^2}{155} \text{ for speeds of 65 km/h (} \frac{WS^2}{60} \text{ for speeds of 40 mph) or less and } 0.62 \cdot WS \text{ for speeds of 70 km/h (WS for speeds of 45 mph) or more.}$$

Where S = Off Peak 85th Percentile Speed in km/h or mph.
 W = Width of Lateral Traffic Shift in meters (feet).

NOTES:

1. Bay taper length = 18 m (60 ft) or 27 (90 ft) m for Business, Residential and Urban Areas and 36 m (120 ft) for high speed Rural Areas.
2. See Striping Details 21 through 23 or 28 through 30.
3. On two lane roads, use Striping Details 21 through 23 for one half (1/2) of the passing sight distance for the prevailing speed.
4. See Striping Detail 38, use a minimum storage length of 15 m (50 ft).
5. See Highway Design Manual, Section 405.2 for design details.

Figure 3B-102 (CA). Examples of Fire Hydrant Location Pavement Markers

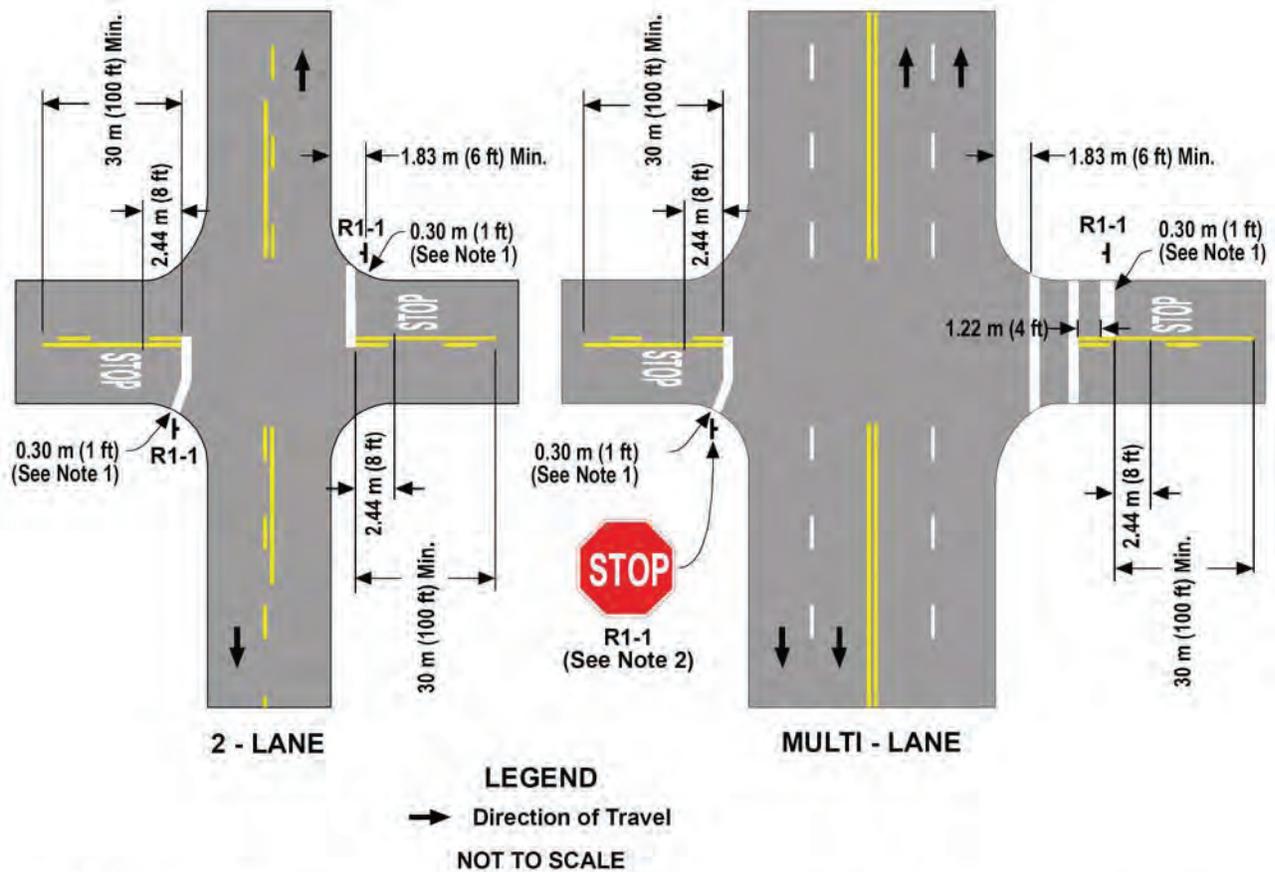


LEGEND

 Fire Hydrant
  Blue Retroreflective Raised Pavement Marker

NOT TO SCALE

Figure 3B-103 (CA). Examples of Intersection Markings

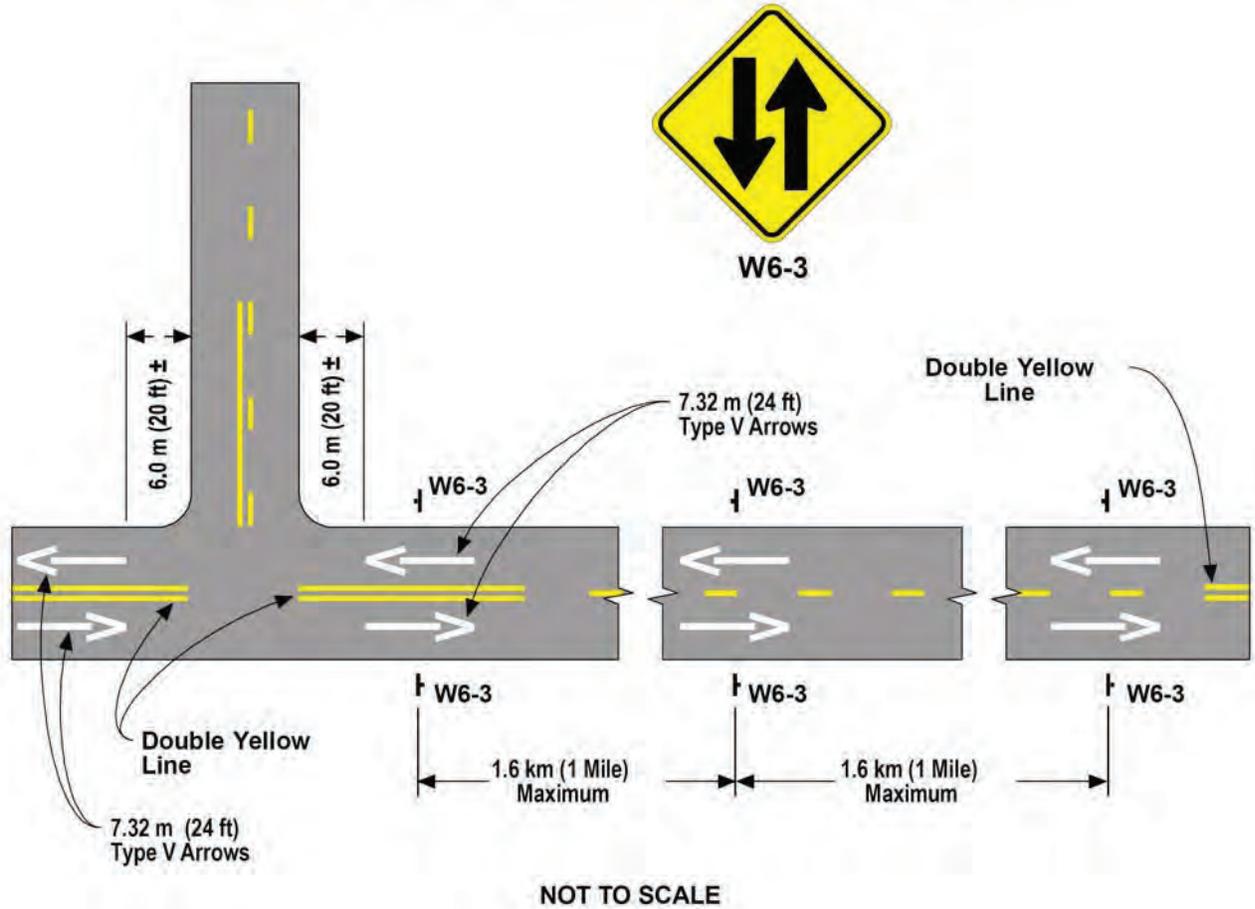


NOTES:

1. The Limit Line is optional, refer to Section 3B.16. The Limit Line on wide side roads on long radius corners may be bent at a $45^{\circ} \pm$ angle for traffic making a right turn.
2. When a Stop Ahead (W3-1) or STOP AHEAD (W3-1a) sign is used, a STOP AHEAD pavement marking may be placed to supplement the sign according to Section 3B.19.

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Figure 3B-104 (CA). Treatment for Divided Highway Illusion

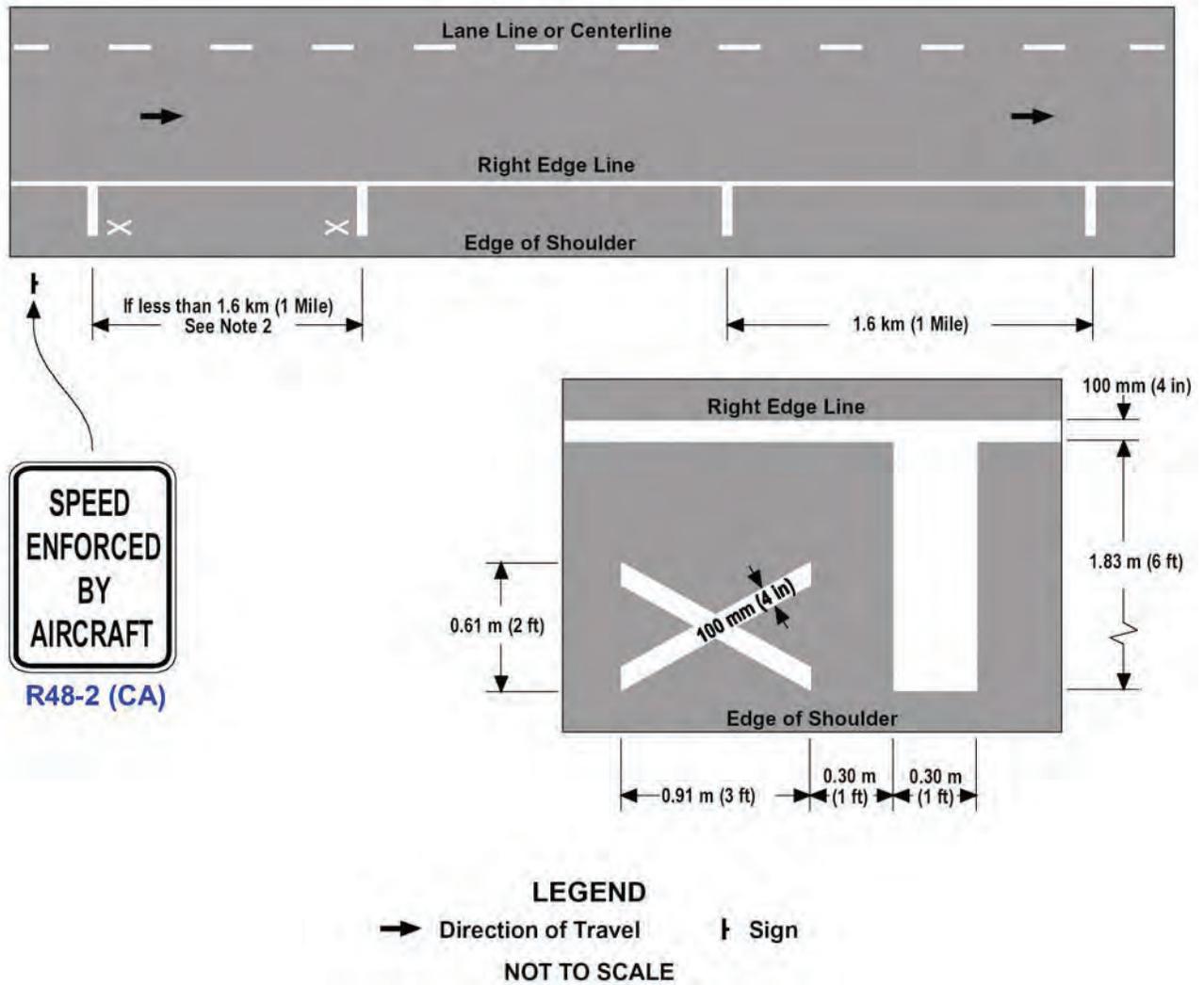


NOTE:

1. Use a Double Yellow Line (Two Direction - No Passing) to discourage wrong way movements at critical locations, such as entering roads or approaches to transitions.

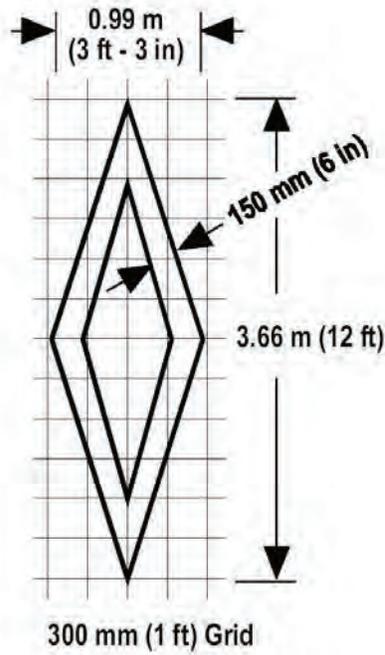
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Figure 3B-105 (CA). Examples of Signs and Markings for Highways Where Speed is Enforced by Aircraft



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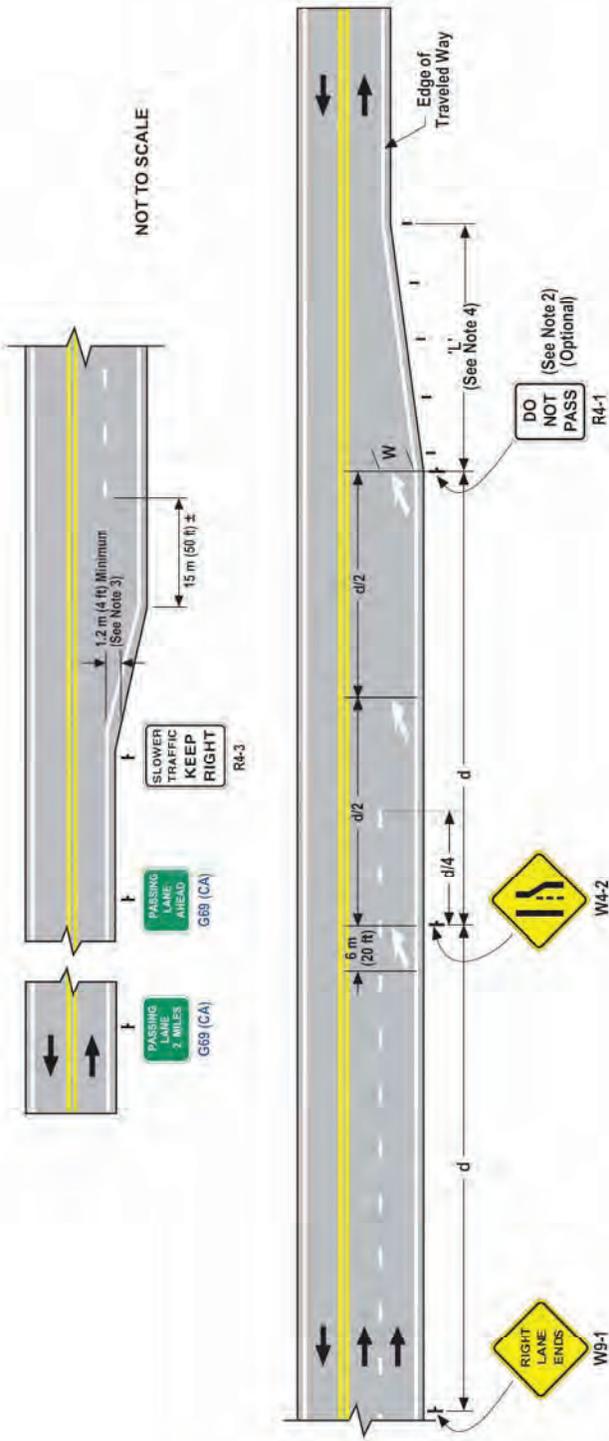
Figure 3B-106 (CA). Diamond Symbol (HOV Lane)



NOTE: The design detail for this symbol is also shown in the Department of Transportation's Standard Plans.

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Figure 3B-107 (CA). Passing Lanes



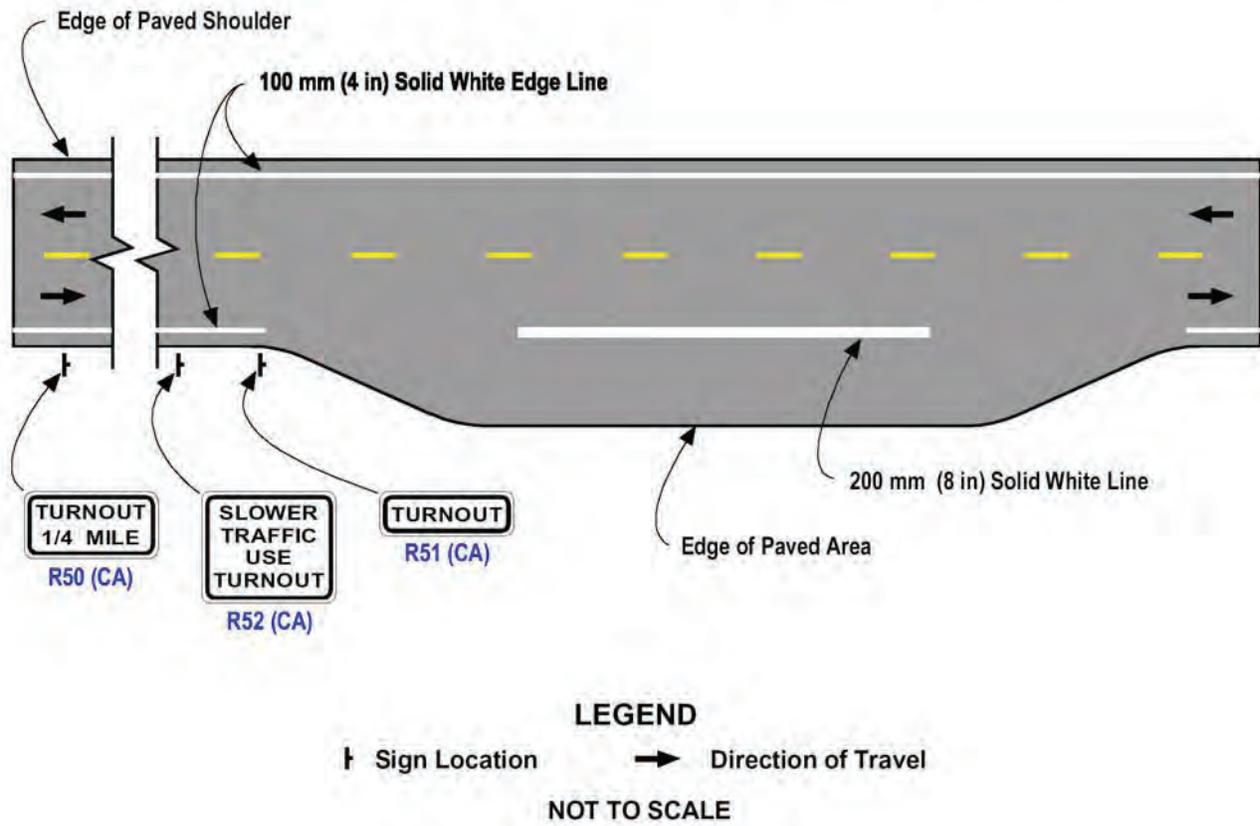
NOTES:

1. For taper lengths, sign and delineator placement at different speeds, see Figure 3B-12 (CA) (Sheet 1 of 3).
2. The R4-1 sign should not be used on a freeway or expressway, etc., where two or more lanes remain after a lane is dropped. See Section 2B.29.
3. To discourage vehicular travel off the traveled way, the Right Edge Line should be continued until there is at least 1.2 m (4 ft) between the beginning of the edge line taper and the edge of the traveled way.
4. Delineators should be spaced approximately 60 m (200 ft) apart. There should be a minimum of 3 delineators throughout the entire length of a lane reduction transition. See Section 3D.04.
5. Lane Reduction Arrows may be placed when a passing lane is 1.6 km (1 mi) or more in length.

| LEGEND | |
|--|------------------------|
| L = Length in meters (feet) | → Direction of Travel |
| S = Posted, 85th Percentile, statutory speed, or design speed for new construction in km/h (mph) | ▬ Lane Reduction Arrow |
| W = Offset in meters (feet) | ▬ Delineators (Type F) |
| d = Advance Placement Distance (see Section 2C.05) | † Sign Location |

| | |
|--|--|
| For speeds 70 km/h (45 mph) or more: L=0.62WS (L=WS) | |
| For speeds 65 km/h (40 mph) or less: L=WS ² / 155 (L=WS ² / 60) | |

Figure 3B-108 (CA). Examples of Signing and Marking Turnouts



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Table 3B-1. Minimum Passing Sight Distances

| 85th- Percentile or Posted or Statutory Speed Limit (km/h) | Minimum Passing Sight Distance (meters) | 85th- Percentile or Posted or Statutory Speed Limit (mph) | Minimum Passing Sight Distance (feet) |
|---|--|--|--|
| 40 | 140 | 25 | 450 |
| 50 | 160 | 30 | 500 |
| 60 | 180 | 35 | 550 |
| 70 | 210 | 40 | 600 |
| 80 | 245 | 45 | 700 |
| 90 | 280 | 50 | 800 |
| 100 | 320 | 55 | 900 |
| 110 | 355 | 60 | 1,000 |
| 120 | 395 | 65 | 1,100 |
| | | 70 | 1,200 |

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Table 3B-2. Standard Edge Line Lane Markings for Preferential Lanes

| Type of Preferential Lane | Left Edge Line | Right Edge Line |
|--|--|--|
| Physically Separated, Nonreversible | A single normal solid yellow line | A single normal solid white line |
| Physically Separated, Reversible | A single normal solid white line | A single normal solid white line |
| Concurrent Flow—Left Side | A single normal solid yellow line | A double solid wide white line where crossing is prohibited (see Figure 3B-26b) A single solid wide white line where crossing is discouraged (see Figure 3B-26c) A single broken wide white line where crossing is permitted (see Figure 3B-26d) |
| Concurrent Flow—Right Side | A double solid wide white line where crossing is prohibited (see Figure 3B-26e) A single solid wide white line where crossing is discouraged (see Figure 3B-26e) A single broken wide white line where crossing is permitted (see Figure 3B-26e) A single dotted normal white line where crossing is permitted for any vehicle to perform a right-turn maneuver (see Figure 3B-26e) | A single normal solid white line |

Notes: If there are two or more preferential lanes, they shall be separated with a normal broken white line.
 The standard lane markings listed in this table are provided in a tabular format for reference.
 This information is also described in the second Standard in Section 3B.23.

Table 3B-2(CA). Standard Edge Line Lane Markings for Preferential Lanes

| Type of Preferential Lane | Left Edge Line | Right Edge Line |
|--------------------------------------|--|---|
| Physically-Separated, Non-Reversible | A Single normal solid yellow line | A Single normal solid white line |
| Physically-Separated, Reversible | A Single normal solid white line | A Single normal solid white line |
| Concurrent Flow – Left Side | A Single normal solid yellow line | <p>A single solid wide white line where crossing is discouraged (see Figure 3B-26c)</p> <p>A single broken wide white line where crossing is permitted (see Figure 3B-26d) for full-time preferential lane ingress/egress segments</p> <p>A single broken 100 mm (4 in) white line for part-time preferential lanes where crossing is permitted</p> |
| Concurrent Flow – Right Side | <p>A single solid wide white line where crossing is discouraged (see Figure 3B-26c)</p> <p>A single broken 100 mm (4 in) white line for part-time preferential lanes where crossing is permitted</p> <p>A single dotted normal white line where crossing is permitted for any vehicle to perform a right-turn maneuver (see Figure 3B-26e)</p> | A Single normal solid white line |

Notes: If there are two or more preferential lanes, they shall be separated with a normal broken white line.

The standard lane markings listed in this table are provided in a tabular format for reference.

This information is also described in the second Standard in Section 3B.23.

Table 3B-101(CA). Rumble Strip Installation Guide

| Rumble Strip Treatment | Rumble Strip Depth | Shoulder Type | Bicycles Permitted | Minimum Shoulder Width |
|---|---|---------------|--------------------|------------------------|
| Rolled-In Rumble Strip Treatment Standard Plan A40 | 25 mm (1 in) | ACC Only | YES | 1.5 m (5 ft) |
| | | | NO | 1.2 m (4 ft) |
| Ground-In Rumble Strip Treatment Standard Plan A40 | 8 (+/- 1.5) mm (0.33 in (+/- 0.06 in)) | ACC and PCC | YES | 1.5 m (5 ft) |
| | | | NO | 1.2 m (4 ft) |
| Raised and Inverted Profile Thermoplastic | N/A | ACC and PCC | YES | No Minimum |
| | | | NO | No Minimum |
| Centerline Ground-In Rumble Strip Treatment Experimental | 8 (+/- 1.5) mm (0.33 in (+/- 0.06 in)) | ACC and PCC | N/A | N/A |

Note: Ground-In Rumble Strip Treatments that are greater than 8.5 (+/-1.5) mm (0.33 in (+/-0.06 in)) in depth shall not be installed on shoulders where bicyclists are allowed.

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CHAPTER 3C. OBJECT MARKERS

Section 3C.01 Object Marker Design and Placement Height

Support:

Object markers are used to mark obstructions within or adjacent to the roadway.

Standard:

When used, object markers (see Figure 3C-1) shall consist of an arrangement of one or more of the following types:

Type 1—either a marker consisting of nine yellow retroreflectors, each with a minimum diameter of 75 mm (3 in), mounted symmetrically on a yellow (OM1-1) or black (OM1-2) diamond panel 450 mm (18 in) or more on a side; or on an all-yellow retroreflective diamond panel (OM1-3) of the same size.

Type 2—either a marker (OM2-1V or OM2-1H) consisting of three yellow retroreflectors, each with a minimum diameter of 75 mm (3 in), arranged either horizontally or vertically on a white panel measuring at least 150 x 300 mm (6 x 12 in); or on an all-yellow horizontal or vertical retroreflective panel (OM2-2V or OM2-2H), measuring at least 150 x 300 mm (6 x 12 in).

Type 3—a striped marker, 300 x 900 mm (12 x 36 in), consisting of a vertical rectangle with alternating black and retroreflective yellow stripes sloping downward at an angle of 45 degrees toward the side of the obstruction on which traffic is to pass. The minimum width of the yellow and black stripes shall be 75 mm (3 in).

Type L(CA) Utility Pole marker shall be yellow retroreflective material consisting of three 50 x 300 mm (2 x 12 in) horizontal rectangles arranged vertically on a utility pole as shown in Figure 3C-1(CA).

Type Q(CA) object marker shall be a vertical tubular marker, with a height of 450 to 600 mm (18 to 24 in) and a minimum cross sectional dimension of 57 mm (2 ¼ in). The yellow retroreflective material shall consist of three bands, each 75 mm (3 in) in height or a single band 225 mm (9 in) in height as shown in Figure 3C-1(CA).

Type R(CA) (OM-3C) object marker size shall be 600 x 750 mm (24 x 30 in).

Support:

A cross-reference of object markers is shown in Table 3C-101(CA).

A better appearance can be achieved if the black stripes are wider than the yellow stripes.

Type 3 object markers with stripes that begin at the upper right side and slope downward to the lower left side are designated as right object markers (OM-3R). Object markers with stripes that begin at the upper left side and slope downward to the lower right side are designated as left object markers (OM-3L).

Guidance:

~~When used for marking objects in the roadway or objects that are 2.4 m (8 ft) or less from the shoulder or curb, the mounting height to the bottom of the object marker should be at least 1.2 m (4 ft) above the surface of the nearest traffic lane.~~

~~When used to mark objects more than 2.4 m (8 ft) from the shoulder or curb, the mounting height to the bottom of the object marker should be at least 1.2 m (4 ft) above the ground.~~

Standard:

Figure 3C-1(CA) shall be used for mounting height of object markers.

Option:

When object markers or markings are applied to an object that by its nature requires a lower or higher mounting, the vertical mounting height may vary according to need.

Section 3C.02 Markings for Objects in the Roadway

Standard:

Obstructions within the roadway shall be marked with a Type 1 or Type 3 object marker. In addition to markers on the face of the obstruction, warning of approach to the obstruction shall be given by appropriate pavement markings (see Section 3B.10).

Option:

To provide additional emphasis, large surfaces such as bridge piers may be painted with diagonal stripes, 300 mm (12 in) or greater in width, similar in design to the Type 3 object marker.

Standard:

The alternating black and retroreflective yellow stripes (OM-3L, OM-3R) shall be sloped down at an angle of 45 degrees toward the side on which traffic is to pass the obstruction. If traffic can pass to either side of the obstruction, the alternating black and retroreflective yellow stripes (OM-3C) shall form chevrons that point upwards.

Option:

Appropriate signs (see Sections 2B.33 and 2C.20) directing traffic to one or both sides of the obstruction may be used instead of the object marker.

Objects in a paved area within 2.4 m (8 ft) of the traveled way may be marked with a Type P(CA) (OM-3L, OM-3R) or Type R(CA) (OM-3C) object marker.

The Type Q(CA) object marker may be used to emphasize objects within the roadway, for example, curb noses, where it is desirable that the marker be visible from all directions.

Guidance:

If any object marker is located behind the guard rail, all of the marker panel should be visible to approaching traffic. The Type P(CA) (OM-3L, OM-3R) object marker should be in line with the inner edge of the obstruction.

Section 3C.03 Markings for Objects Adjacent to the Roadway

Support:

Objects not actually in the roadway are sometimes so close to the edge of the road that they need a marker. These include underpass piers, bridge abutments, handrails, and culvert headwalls. In other cases there might not be a physical object involved, but other roadside conditions exist, such as narrow shoulders, drop-offs, gores, small islands, and abrupt changes in the roadway alignment, that might make it undesirable for a road user to leave the roadway, and therefore would create a need for a marker.

Option:

Type 2 or Type 3 object markers may be used at locations such as those described in the preceding Support paragraph.

Standard:

If used, the inside edge of the marker shall be in line with the inner edge of the obstruction.

Guidance:

Standard warning signs (see Chapter 2C) should also be used where applicable.

Option:

Objects outside of the paved shoulder, within 3.6 m (12 ft) of the traveled way, may be marked with Type L(CA) object markers.

The Type L(CA) (OM2-2V and OM2-2H) object markers may be placed in front of, alongside of, or attached to the object. Where objects are very close to each other, only the first object may need to be marked.

The Type L(CA) Utility Pole marker may be used to mark a utility pole.

Standard:

If used on State highways, Type L-1(CA) (OM2-2V) object marker shall be used instead of Type L-2(CA) (OM2-2V).

Guidance:

If used, the utility company should be responsible for installing and maintaining the Type L(CA) Utility Pole marker.

Support:

See Section 2C.09 and 2C.38 for use of Type N-1(CA) (OM1-3) object markers in conjunction with One-Directional Large Arrow (W1-6) and Two-Direction Large Arrow (W1-7) signs for abrupt changes in the roadway alignment.

See Section 6F.108(CA) for use of Type N(CA), P(CA) and R(CA) object markers for temporary traffic control.

Option:

If engineering judgment indicates that the exit gore at an interchange cannot be negotiated in a reasonably safe manner, then in addition to the Type F and G delineators, Type R(CA) (OM-3C) object marker may be used as shown in Figure 3D-102(CA).

Section 3C.04 End-of-Roadway Markers

Support:

The end-of-roadway marker is used to warn and alert road users of the end of a roadway in other than construction or maintenance areas.

Standard:

The end-of-roadway marker (see Figure 3C-1) shall be one of the following: a marker consisting of nine red retroreflectors, each with a minimum diameter of 75 mm (3 in), mounted symmetrically on a red (OM4-1) or black (OM4-2) diamond panel 450 mm (18 in) or more on a side; or a retroreflective red diamond panel (OM4-3) 450 mm (18 in) or more on a side.

Option:

~~The end-of-roadway marker may be used in instances where there are no alternate vehicular paths.~~

Standard:

The end-of-roadway marker shall be used at the end of a road or cul-de-sac street where there is no alternate vehicular path.

Where conditions warrant, more than one marker, or a larger marker with or without a Type III barricade (see Section 3F.01), may be used at the end of the roadway.

Standard:

~~The minimum mounting height to the bottom of an end-of-roadway marker shall be 1.2 m (4 ft) above the edge of the pavement.~~ Figure 3C-1(CA) shall be used for mounting height of the end-of-the-roadway marker.

Guidance:

Appropriate advance warning signs (see Chapter 2C) should be used.

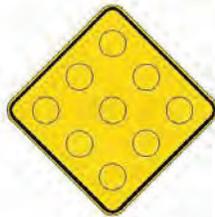
Support:

See Section 2C.21 for use of end-of-roadway marker in conjunction with END (W31(CA)) sign.

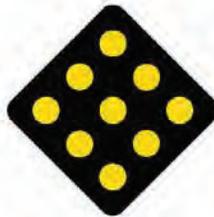
(This space left intentionally blank)

Figure 3C-1. Object Markers and End-of-Roadway Markers

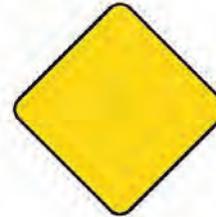
Type 1 Object Markers



OM1-1

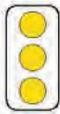


OM1-2



OM1-3

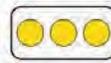
Type 2 Object Markers



OM2-1V



OM2-2V



OM2-1H



OM2-2H

Type 3 Object Markers



OM-3L



OM-3C



OM-3R

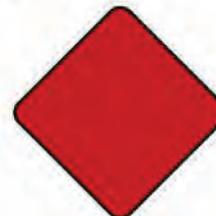
End-of-Roadway Markers



OM4-1



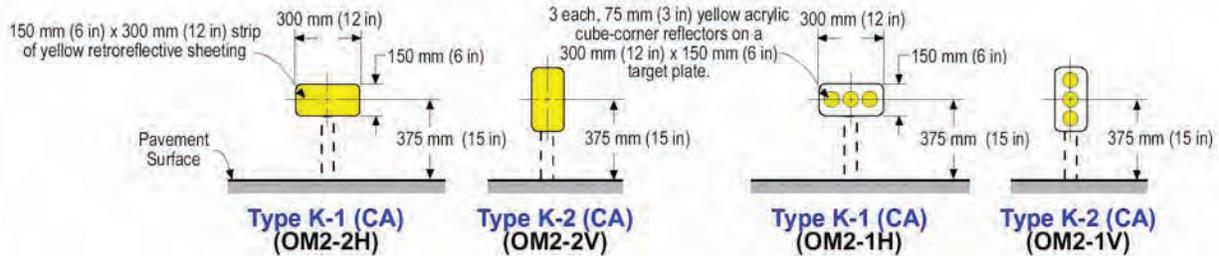
OM4-2



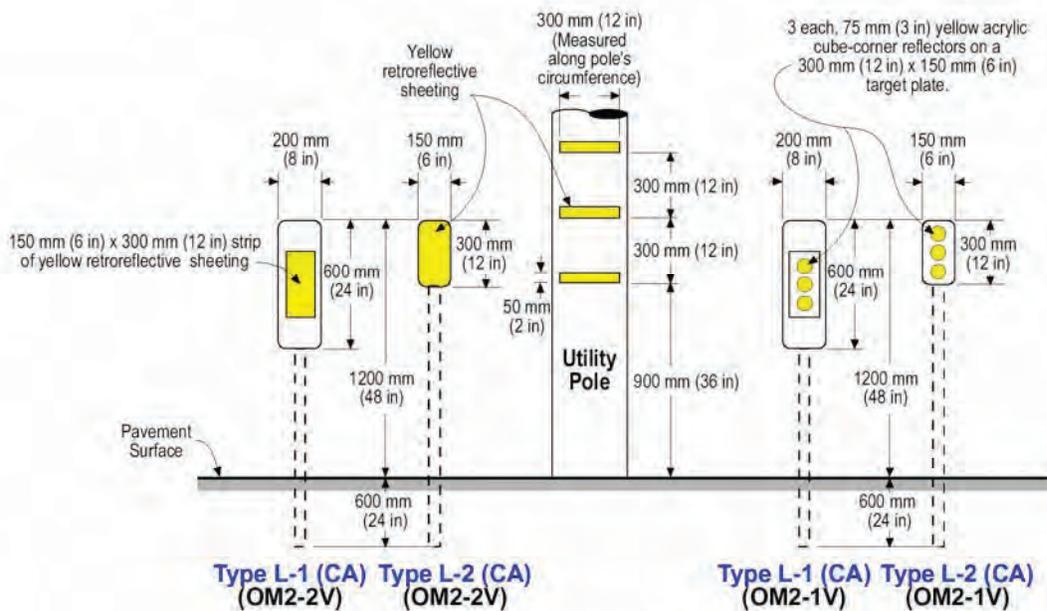
OM4-3

Figure 3C-1 (CA). California Object Markers and End-of-Roadway Markers (Sheet 1 of 2)

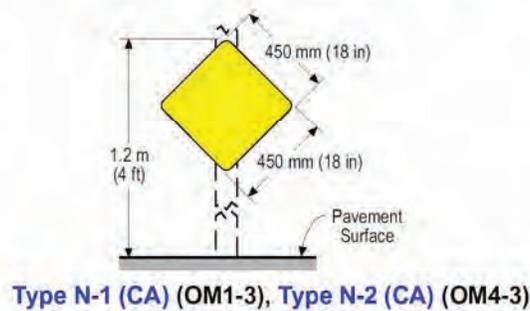
Typical Type K (CA) Object Marker



Typical Type L (CA) Object Marker



Typical Type N (CA) Object Marker



NOT TO SCALE

Figure 3C-1 (CA). California Object Markers and End-of-Roadway Markers (Sheet 2 of 2)

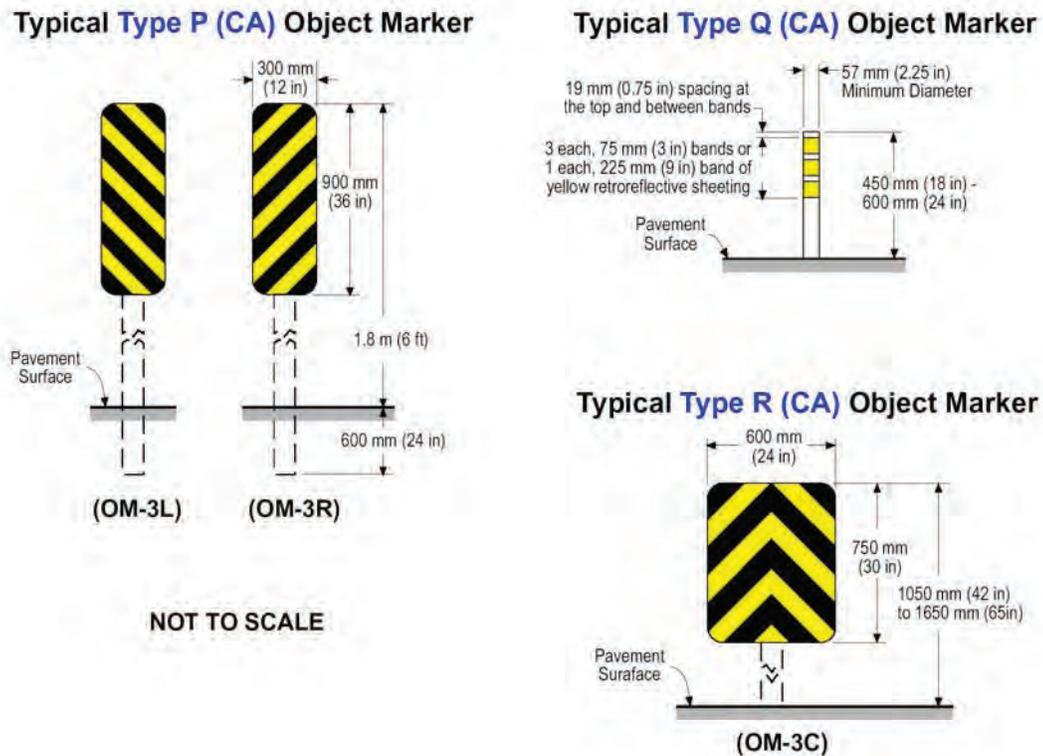


Table 3C-101(CA). List of California Object Markers

| California Code (Type) | MUTCD Code | Title | California MUTCD Section |
|------------------------|-----------------|---------------------------------|---|
| K-1(CA) | OM2-2H | Typical CA Type K Object Marker | 3C.01, 3C.03 |
| K-2(CA) | OM2-2V | Typical CA Type K Object Marker | 3C.01, 3C.03 |
| L-1(CA) | OM2-2V | Typical CA Type L Object Marker | 3C.01, 3C.03 |
| L-2(CA) | OM2-2V | Typical CA Type L Object Marker | 3C.01, 3C.03 |
| N-1(CA) | OM1-3 | Typical CA Type N Object Marker | 2C.09, 2C.38, 3C.01, 3C.02, 3C.03, 6F.108 |
| N-2(CA) | OM4-3 | Typical End-of-Roadway Marker | 2C.21, 3C.04 |
| P(CA) | OM-3L and OM-3R | Typical CA Type P Object Marker | 3C.01, 3C.02, 6F.108 |
| Q(CA) | None | Typical CA Type Q Object Marker | 3C.01, 3C.02 |
| R(CA) | OM-3C | Typical CA Type R Object Marker | 3C.01, 3C.02 |
| Utility Pole | None | Typical CA Type L Object Marker | 3C.01, 3C.03 |

CHAPTER 3D. DELINEATORS

Section 3D.01 Delineators

Support:

Delineators are particularly beneficial at locations where the alignment might be confusing or unexpected, such as at lane reduction transitions and curves. Delineators are effective guidance devices at night and during adverse weather. An important advantage of delineators in certain locations is that they remain visible when the roadway is wet or snow covered.

Delineators are considered guidance devices rather than warning devices.

Option:

Delineators may be used on long continuous sections of highway or through short stretches where there are changes in horizontal alignment.

Section 3D.02 Delineator Design

Standard:

Delineators shall be retroreflective devices mounted above the roadway surface and along the side of the roadway in a series to indicate the alignment of the roadway. Delineators shall consist of retroreflector units that are capable of clearly retroreflecting light under normal atmospheric conditions from a distance of 300 m (1,000 ft) when illuminated by the high beams of standard automobile lights.

Retroreflective elements for delineators shall have a minimum dimension of 75 mm (3 in).

Option:

Elongated retroreflective units of appropriate size may be used in place of two retroreflectors mounted as a unit.

Support:

There are two classes of delineator posts and several types of retroreflectorization as shown in Figure 3D-101(CA).

Section 3D.03 Delineator Application

Standard:

The color of delineators shall conform to the color of edge lines stipulated in Section 3B.06, except for the use of red at truck escape ramps.

Single delineators shall be provided on the right side of freeways and expressways and on at least one side of interchange ramps, except in the following cases:

A. On tangent sections of freeways and expressways when all of the following conditions are met:

- 1. Raised pavement markers are used continuously on lane lines throughout all curves and on all tangents to supplement pavement markings.**
- 2. Where whole routes or substantial portions of routes have large sections of tangent alignment.**
- 3. Roadside delineators are used to lead into all curves.**

B. On sections of roadways where continuous lighting is in operation between interchanges.

Option:

Delineators may be provided on other classes of roads. Single delineators may be provided on the left side of roadways.

Guidance:

Single delineators should be provided on the outside of curves on interchange ramps.

Where median crossovers are provided for official or emergency use on divided highways and where these crossovers are to be marked, a double yellow delineator should be placed on the left side of the through roadway on the far side of the crossover for each roadway.

~~Double or vertically elongated delineators should be installed at 30-m (100-ft) intervals along acceleration and deceleration lanes.~~

Option:

~~Red delineators may be used on the reverse side of any delineator where it would be viewed by a road user traveling in the wrong direction on that particular ramp or roadway. In California, red markers are used for wrong-way traffic, not delineators.~~

Delineators of the appropriate color may be used to indicate a lane reduction transition where either an outside or inside lane merges into an adjacent lane.

Guidance:

For lane reduction transitions, the delineators should be used adjacent to the lane or lanes reduced for the full length of the transition and should be so placed and spaced to show the reduction (see Figure ~~3B-12~~ **3B-12(CA)**).

Support:

Delineators are not necessary for traffic moving in the direction of a wider pavement or on the side of the roadway where the alignment is not affected by the lane reduction transition.

Guidance:

On a highway with continuous delineation on either or both sides, delineators should be carried through transitions.

Option:

On a highway with continuous delineation on either or both sides, the spacing between a series of delineators may be closer.

Standard:

When used on a truck escape ramp, delineators shall be red.

Guidance:

Red delineators should be placed on both sides of truck escape ramps. The delineators should be spaced at 15 m (50 ft) intervals for a distance sufficient to identify the ramp entrance. Delineator spacing beyond the ramp entrance should be adequate for guidance according to the length and design of the escape ramp.

Option:

Where delineation is required within a paved area, surface mounted channelizers may be used. See Section 3F.02.

Support:

Examples of the use of delineators are shown in Figure 3D-101(CA). Color exceptions are shown in Figure 3D-103(CA) and 3D-104(CA).

Following are typical delineators and their uses:

- Type E - White Retroreflector (2 Sided). For use on the left or right of 2-lane 2-way streets and highways when it is desirable to have a reflector on the front, and one on the back of the delineator facing the opposite direction of traffic.
- Type F - White Retroreflector (1 Sided). For use on the right of freeways and expressways. They may also be used on 2-lane 2-way streets and highways when the Type E is not needed.
- Type G - Yellow Retroreflector (1 Sided). For use on the left of divided highways and 2-lane highway intersections as shown in Figure 3D-102(CA).
- Type J - Red Retroreflector (1 Sided). For placement on both sides of Truck Escape Ramps as shown in Figure 3D-103(CA).

Section 3D.04 Delineator Placement and Spacing

Guidance:

Delineators should be mounted on suitable supports so that the top of the highest retroreflector is 1.2 m (4 ft) above the near roadway edge. They should be placed 0.6 to ~~2.4 m~~ **1.8 m (2 to 6 ft)** outside the outer edge of the shoulder, or if appropriate, in line with the roadside barrier that is 2.4 m (8 ft) or less outside the outer edge of the shoulder.

Delineators should be placed at a constant distance from the edge of the roadway, except that where an obstruction intrudes into the space between the pavement edge and the extension of the line of the delineators, the delineators should be transitioned to be in line with or inside the innermost edge of the

obstruction. If the obstruction is a guardrail, the delineators should be transitioned to be either just behind, directly above (in line with), or on the innermost edge of the guardrail.

~~Delineators should be spaced 60 to 160 m (200 to 530 ft) apart on mainline tangent sections. Delineators should be spaced 30 m (100 ft) apart on ramp tangent sections.~~

Delineators should be spaced 160 m (530 ft) apart on mainline tangent sections. Delineators should be spaced 60 m (200 ft) apart on ramp tangent sections.

Support:

Examples of delineator installations are shown in Figure 3D-1.

Option:

When uniform spacing is interrupted by such features as driveways and intersections, delineators which would ordinarily be located within the features may be relocated in either direction for a distance not exceeding one quarter of the uniform spacing. Delineators still falling within such features may be eliminated.

Delineators may be transitioned in advance of a lane transition or obstruction as a guide for oncoming traffic.

Guidance:

The spacing of delineators should be adjusted on approaches to and throughout horizontal curves so that several delineators are always simultaneously visible to the road user. The approximate spacing shown in Table 3D-1 should be used.

Installations should be inspected at night to ensure that there are no confusing or misleading delineators.

Standard:

Unless local conditions justify otherwise, delineators shall be placed on all State highways.

Guidance:

Delineators should also be provided on all city and county roads.

When used, delineators should be placed as follows:

- a On the outsides of highway curves of 915 m (3000 ft) radius or less (including medians in divided highways), freeway exit and entrance ramps and connectors. Exception to this, is where a median barrier is delineated as shown in the Median Barrier Delineation Detail in Figure 3D-105(CA). Delineator spacing on curves is shown in Figure 3D-1 and Table 3D-1.
- b On the right of tangent sections of freeway entrance and exit ramps, collector roads, freeway connectors and lane reduction transition sections at 60 m (200 ft) spacing.
- c On embankments higher than 3.0 m (10 ft) and with side slopes steeper than 1:4. Delineator spacing is approximately 160 m (525 ft).
- d On approaches to narrow bridges as shown in Figure 3D-104(CA).
- e On tangent sections of rural State highways where there are no reflective pavement markers, such as in snow areas. Delineator spacing is approximately 160 m (525 ft).
- f On all new guardrail or bridge rail installations, or when maintenance is required on existing guardrail or bridge rail, within 3.66 m (12 ft) of the edge of traveled way and curves of 915 m (3000 ft) radius or less. The spacing on tangent sections is approximately 160 m (525 ft). For spacing on curves, see Figure 3D-1 and Table 3D-1.

Option:

Delineators may also be placed as follows:

- a At intersections, road approaches, and median openings, as shown in Figure 3D-102(CA).
- b On sections of highway with non-standard shoulder width.

If the exit gore at an interchange is not illuminated or is partially illuminated, delineators may be placed as shown in Figure 3D-102(CA) per the following details:

- a) Type F - White Retroreflectors (1 Sided) on the right side, beginning at a distance > 5S from the theoretical gore point at 30 m (100 ft) spacing.
- b) Type G - Yellow Retroreflectors (1 Sided) on the left side of the exit at 3 m (10 ft) spacing and then shifting to 30 m (100 ft) spacing.
- c) Type F - White Retroreflectors (1 Sided) on the right side of the mainline, downstream of the exit at 3 m (10 ft) spacing.

Support:

Refer to Table 3D-1 for formula to calculate value of S.

Section 3D.101(CA) Culvert Markers

Support:

Culvert markers are placed as a convenience to maintenance crews in marking locations of culvert openings. Such marking is sometimes necessary to protect culvert ends from damage from adjacent operations as well as to serve as an aid in locating culverts during storm conditions.

Refer to Department of Transportation's Maintenance Manual, Chapter M5 (Traffic Safety Devices) for more information on culvert markers. See Section 1A.11 for information regarding this publication.

Option:

Culvert markers may be placed on both sides of the highway at those culverts where they are necessary.

Guidance:

Culvert markers should be so placed as not to interfere with a line of delineators.

Standard:

Culvert markers shall not be retroreflective, or contain kilometer post marker information.

Section 3D.102(CA) Emergency Passageway Marker

Support:

Except for emergency passageways in median barriers, median openings are not allowed on freeways.

Refer to Department of Transportation's Traffic Manual, Section 7-04.7 for design considerations of emergency passageways. See Section 1A.11 for information regarding this publication.

Guidance:

Where freeway median passageways are provided for emergency vehicles, delineation for the crossover should be as follows:

- a At a point, 320 m (1/5 mi) in advance of the crossover, one Class 1 Delineator, with a yellow post and two 75 x 300 mm (3 x 12 in) white retroreflectors stacked vertically (600 mm (24 in) of white retroreflectance), should be placed on the left side of the through roadway facing approaching traffic.
- b At a point, 160 m (1/10 mi) in advance of the crossover, one Class 1 Delineator, with a yellow post and two 75 x 300 mm (3 x 12 in) yellow retroreflectors stacked vertically, should be placed on the left side as in (a).
- c At the far side of the crossover, one Class 1 Delineator, with a yellow post and one 75 x 300 mm (3 x 12 in) white retroreflector over one 75 x 300 mm (3 x 12 in) yellow retroreflector stacked vertically, should be placed on the left side as in (a).

Section 3D.103(CA) Narrow Bridge Signing and Marking

Support:

The placement of warning signs, object markers, delineators, and edge lines at narrow bridges is dependent upon the width of the bridge and approach roadway.

Standard:

Narrow bridge signing and marking shall conform to the details shown in Figure 3D-104(CA).

Section 3D.104(CA) Median Barrier Delineation

Guidance:

Median barriers should be delineated when the clearance between the barrier and the edge of traveled way is less than 2.44 m (8 ft).

In general, when delineated, it should be with an approved median barrier marker, the same color as the left edge line. They should be placed on top of the barrier at 14.64 m (48 ft) centers.

Markers placed on the sides of barriers, near the splash zone, should be avoided because of the tendency to collect dirt which reduces their effectiveness. See Figure 3D-105(CA).

Figure 3D-1. Examples of Delineator Placement

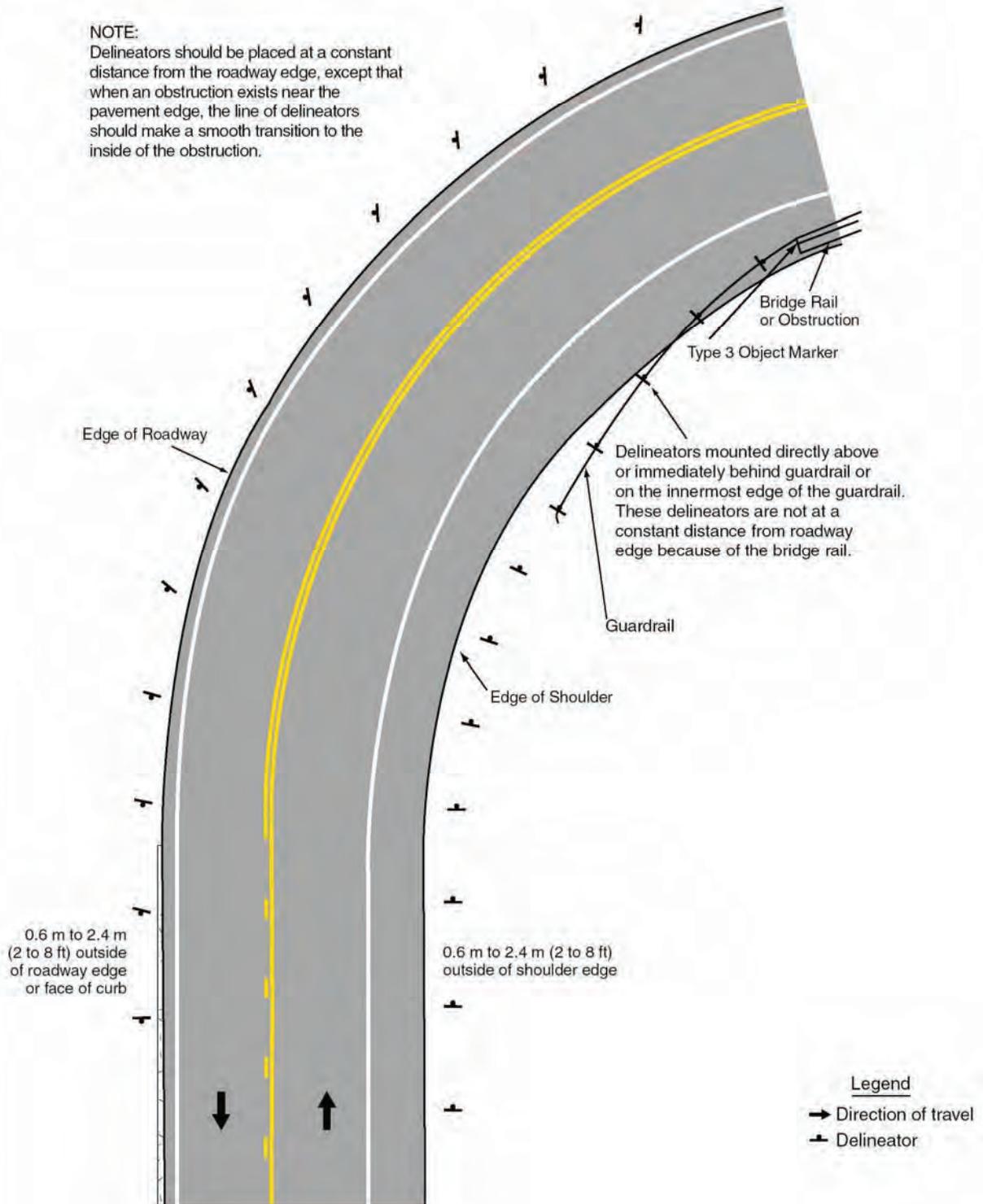
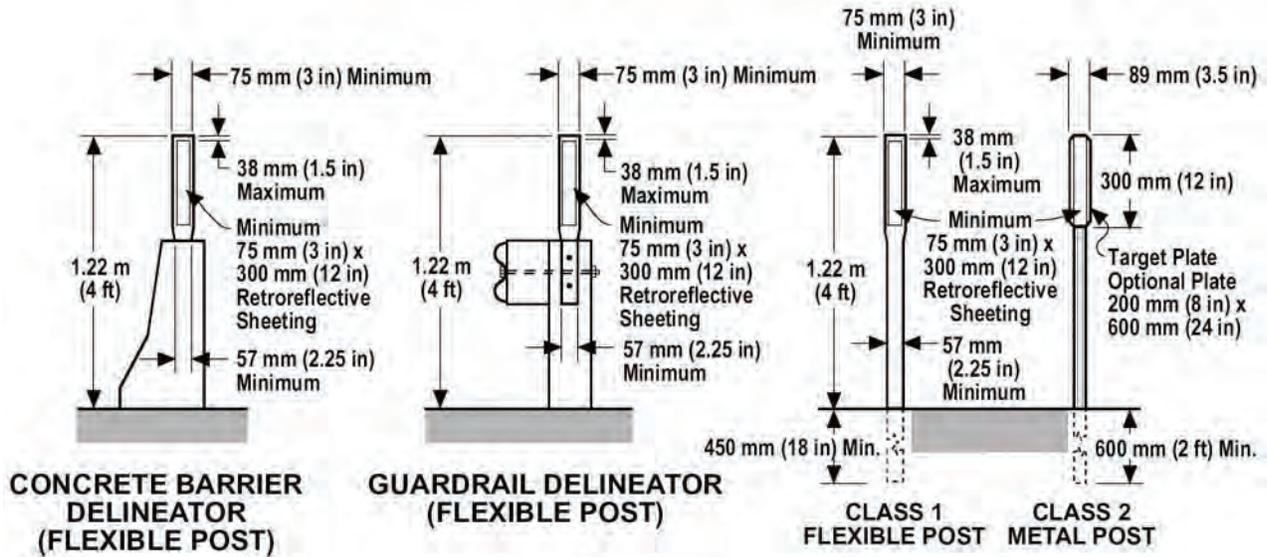
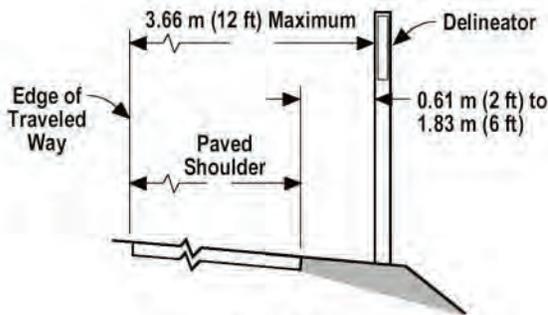


Figure 3D-101 (CA). Examples of Delineators



NOT TO SCALE



TYPICAL DELINEATOR PLACEMENT

TYPES OF DELINEATORS

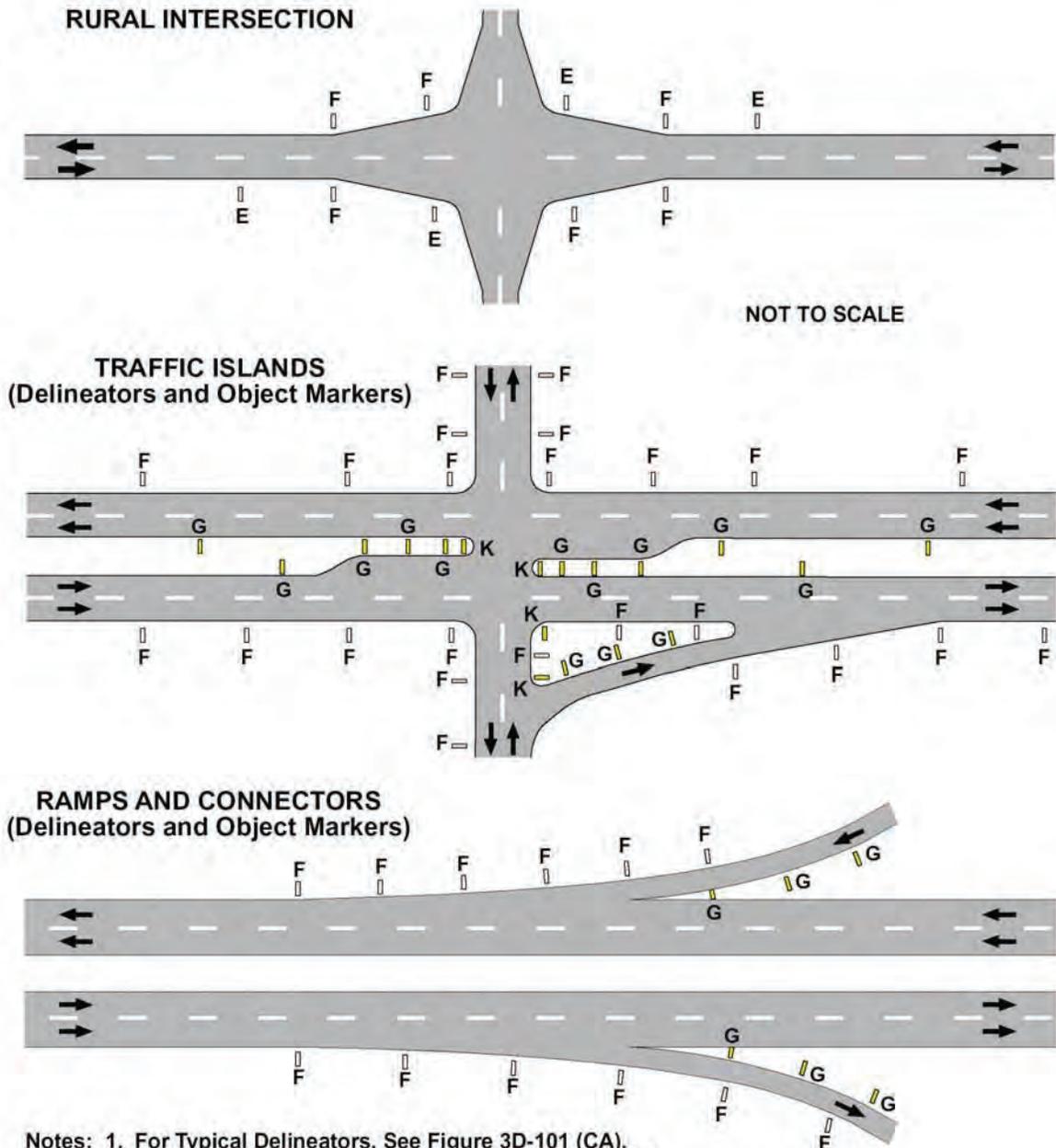
| TYPE | RETROREFLECTOR COLOR | |
|------|----------------------|-------|
| | FRONT | BACK* |
| E | WHITE | WHITE |
| F | WHITE | NONE |
| G | YELLOW | NONE |
| J | RED | NONE |

*Back Retroreflector:
 Class 1 Delineator - 75 mm (3 in) ± square of retroreflective sheeting.
 Class 2 Delineator - 75 mm (3 in) ± acrylic cube-corner retroreflective element.

Notes:

1. Class 1 (Flexible Post) Delineators are standard on State highways, except for certain locations, e.g., snow or protected areas behind guardrail, etc. The color of the post is white.
2. Class 1 (Flexible Post) Delineators used in construction or maintenance zones shall be orange with white retroreflective sheeting. However, if the delineators are to remain in place as a permanent roadway feature after the construction or maintenance period, the color of the post shall be white with the appropriate color of retroreflective sheeting as specified in Section 3D.03.
3. The Type of Retroreflective Element and Class of Post is designated as E-1, F-2, etc.

Figure 3D-102 (CA). Examples of Delineator Placement When Used at Intersections, Islands, Ramps, and Connectors (Sheet 1 of 2)



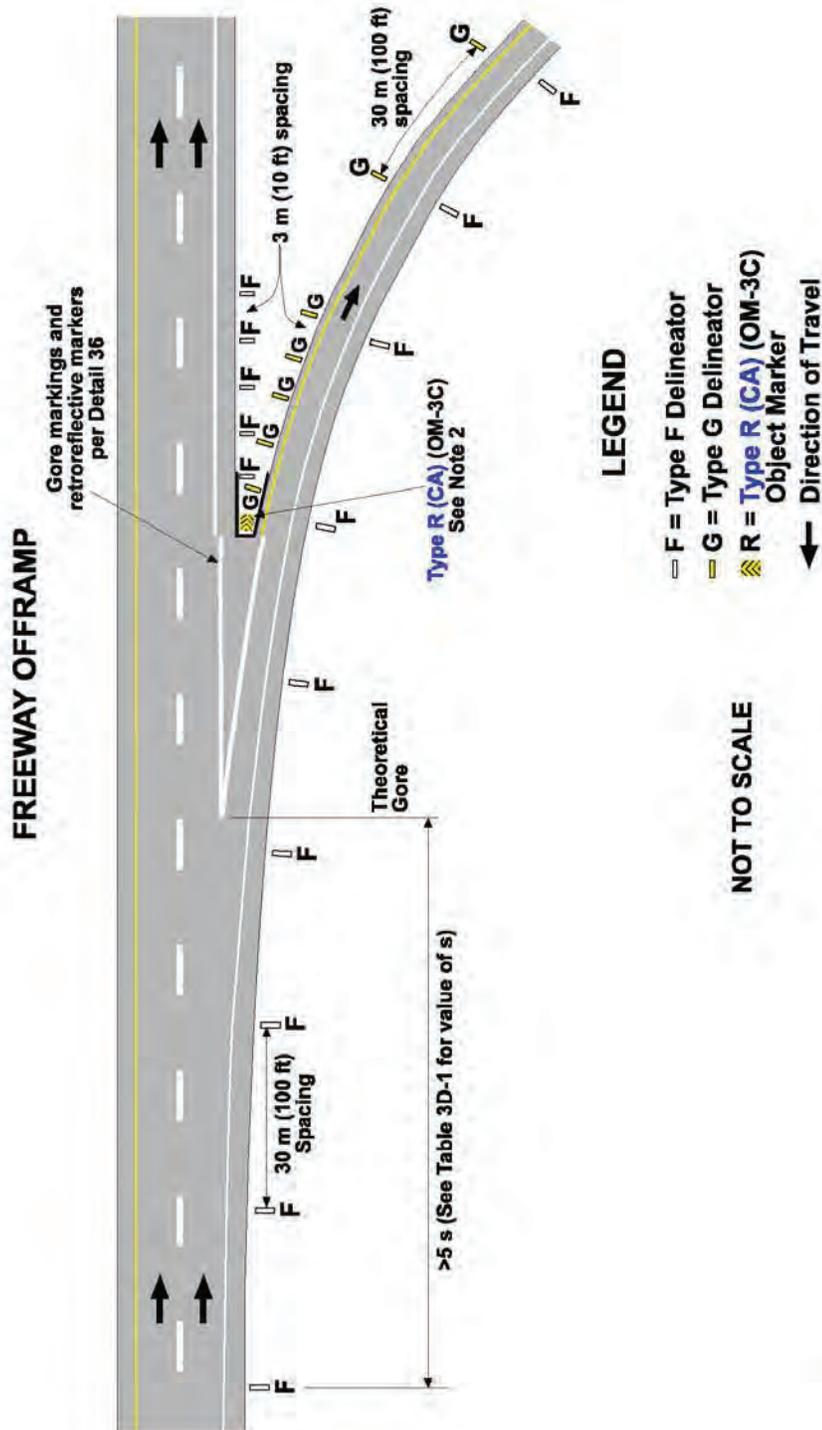
NOT TO SCALE

- Notes: 1. For Typical Delineators, See Figure 3D-101 (CA).
 2. For Delineator Spacing on Curves, See Figure 3D-1.
 3. For Typical Object Markers, See Figure 3C-1 and 3C-1 (CA).

LEGEND

- ▮ E & F = Types of Delineators
- ▮ G = Type of Delineator
- ▮ K = Type K (CA) Object Marker
- ← Direction of Travel

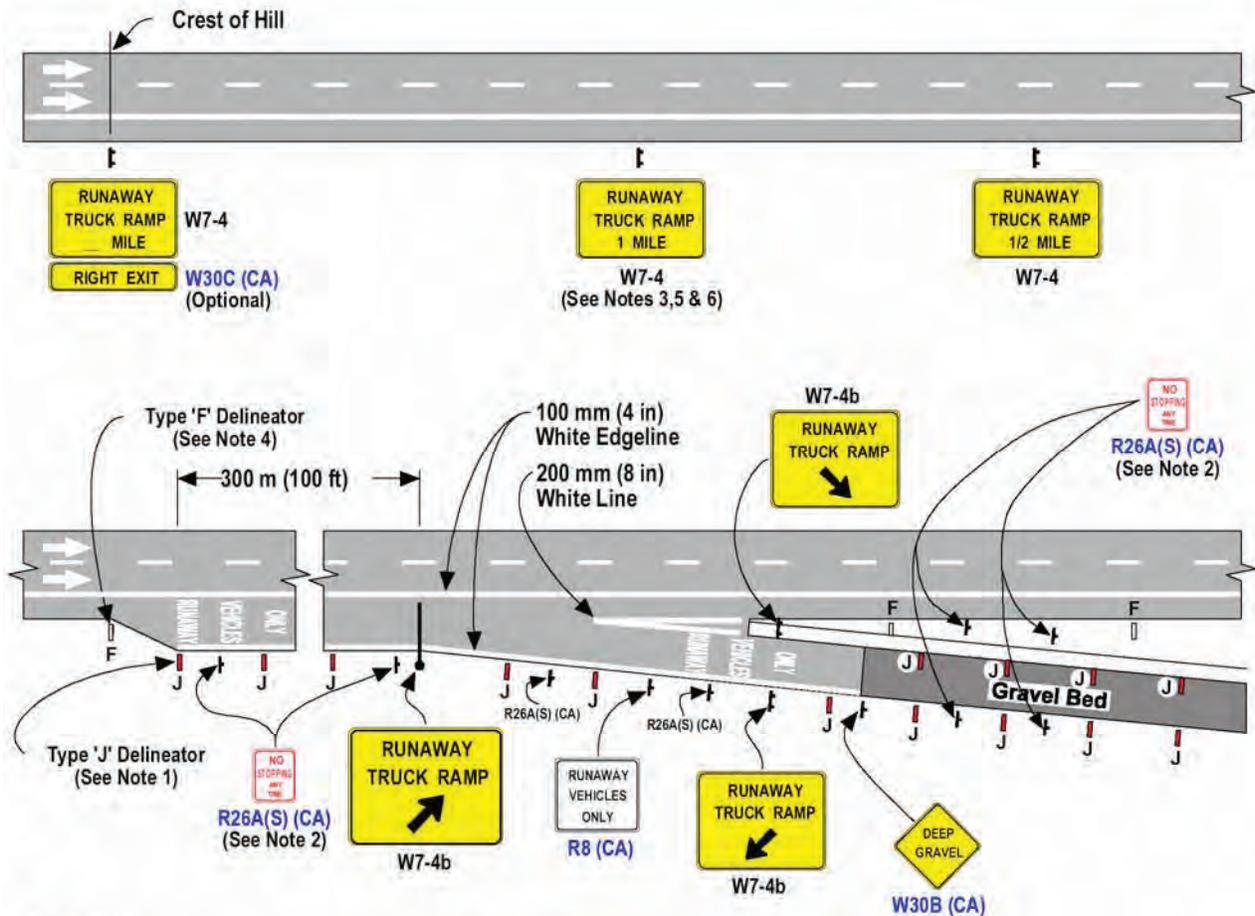
Figure 3D-102 (CA). Examples of Delineator Placement When Used at Intersections, Islands, Ramps, and Connectors (Sheet 2 of 2)



NOTE:

1. Optional delineation if exit gore area is not illuminated or is partially illuminated. See Section 3D.04.
2. To be used if the exit gore can not be negotiated in a reasonably safe manner. See Section 3C.03.

Figure 3D-103 (CA). Examples of Runaway Truck Ramp Signs and Markings



Notes:

1. Place Type 'J' Delineators at 15 m (50 ft) centers. See Figure 3D-101 (CA).
2. Place NO STOPPING ANY TIME, R26A(S) (CA) signs at 75 m (250 ft) centers.
3. Additional RUNAWAY TRUCK RAMP 1 MILE and RUNAWAY TRUCK RAMP 1/2 MILE, W7-4 signs may also be placed in the median on a one-way roadway.
4. Place 3 - Type 'F' Delineators at 150 m (500 ft) centers, preceding and following the Runaway Truck Ramp. See Figure 3D-101 (CA).
5. Additional advance RUNAWAY TRUCK RAMP (2 MILES, 3 MILES, etc.) W7-4 signs may be added as necessary.
6. Overhead signs may be substituted for ground mounted signs.

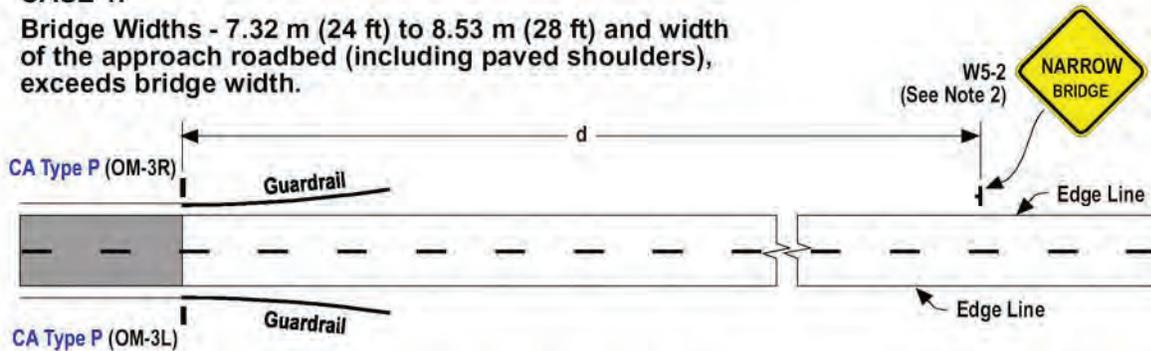
LEGEND

- ▬ F = Type of Delineator
 - ▬ J = Type of Delineator
 - ← Direction of Travel
- NOT TO SCALE

**Figure 3D-104 (CA). Narrow Bridge Signs and Markings
 (One-Way and Two-Way Roadways)**

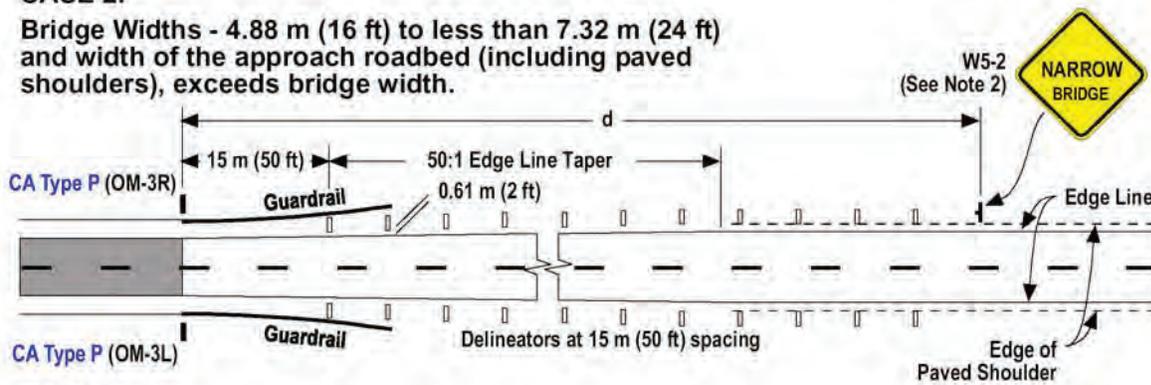
CASE 1:

Bridge Widths - 7.32 m (24 ft) to 8.53 m (28 ft) and width of the approach roadbed (including paved shoulders), exceeds bridge width.



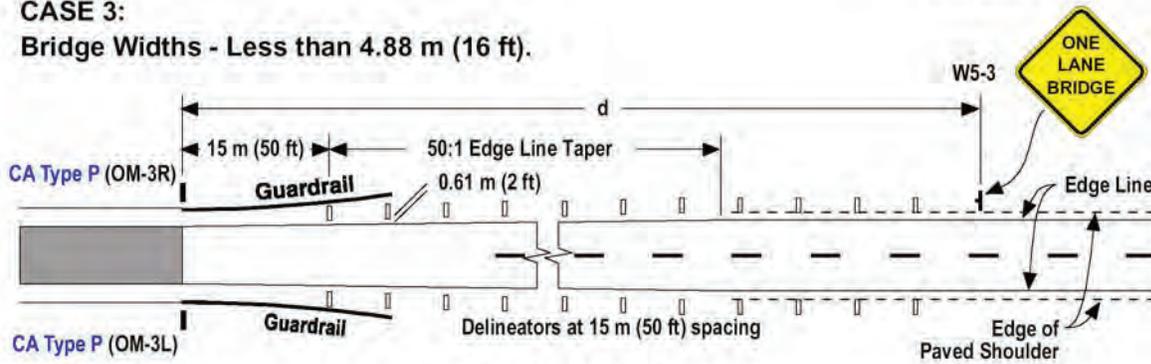
CASE 2:

Bridge Widths - 4.88 m (16 ft) to less than 7.32 m (24 ft) and width of the approach roadbed (including paved shoulders), exceeds bridge width.



CASE 3:

Bridge Widths - Less than 4.88 m (16 ft).



NOT TO SCALE

- Notes: 1. The Edge Line shall be continued across all bridges on State highways.
 2. The NARROW BRIDGE (W5-2) sign should be erected on the right and in the median on a one-way roadway.
 3. Delineators shall be continued across the bridge in Cases 2 and 3.

LEGEND

- █ = CA Type P Object Marker. See Figure 3C-101 (CA).
- d = Advance Placement Distance (see Section 2C.05)
- ▤ = Delineators (Type "F" for One-Way Roadways and Type "E" for Two-Way Roadways). See Figure 3D-101 (CA).

Figure 3D-105 (CA). Examples of Median Barrier Delineation

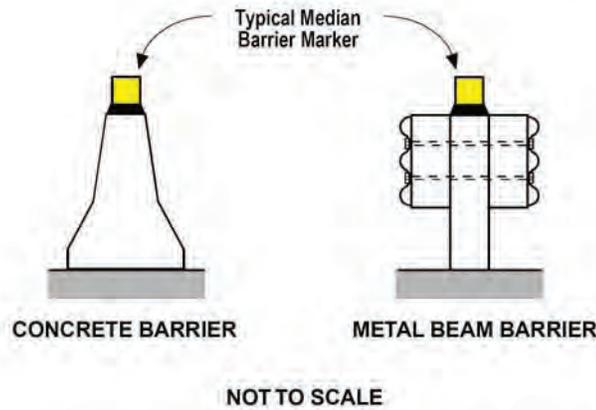


Table 3D-1. Approximate Maximum Spacing for Delineators on Horizontal Curves

| Radius (R) of Curve (meters) | Approximate Spacing (S) on Curve (meters) | Radius (R) of Curve (feet) | Approximate Spacing (S) on Curve (feet) |
|------------------------------------|--|----------------------------------|--|
| 15 | 6 | 50 | 20 |
| 35 | 8 | 115 | 25 |
| 55 | 11 | 180 | 35 |
| 75 | 12 | 250 | 40 |
| 95 | 12 | 300 | 40 |
| 125 | 12 | 400 | 40 |
| 155 | 12 | 500 | 40 |
| 185 | 12 | 600 | 40 |
| 215 | 24 | 700 | 75 |
| 245 | 26 | 800 | 80 |
| 275 | 27 | 900 | 85 |
| 305 | 29 | 1,000 | 90 |

Distances in feet were rounded to the nearest 5 feet.

Spacing for specific radii may be interpolated from table. The minimum spacing should be 6.1 m (20 ft). The spacing on curves should not exceed 90 m (300 ft). In advance of or beyond a curve, and proceeding away from the end of the curve, the spacing of the first delineator is 2S, the second 3S, and the third 6S but not to exceed 90 m (300 ft). S refers to the delineator spacing for specific radii computed from the formula $S=1.7\sqrt{R-15}$ for metric units and $S=3\sqrt{R-50}$ for English units.

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CHAPTER 3E. COLORED PAVEMENTS

Section 3E.01 General

Support:

When used for guidance or regulation of traffic, colored pavements are traffic control devices. Colored pavements also are sometimes used to supplement other traffic control devices.

Colored pavement located between crosswalk lines to emphasize the presence of the crosswalk is not considered to be a traffic control device.

Guidance:

Colored pavements used as traffic control devices should be used only where they contrast significantly with adjoining paved areas.

Colors that degrade the contrast of white crosswalk lines, or that might be mistaken by road users as a traffic control application, should not be used for colored pavement located between crosswalk lines.

Standard:

Colored pavements shall not be used as a traffic control device, unless the device is applicable at all times.

Colored pavements used as traffic control devices shall be limited to the following colors and applications:

- A. Yellow shall be used only for flush or raised median islands separating traffic flows in opposite directions.**
 - B. White shall be used for delineation on shoulders, and for flushed or raised channelizing islands where traffic passes on both sides in the same general direction.**
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CHAPTER 3F. BARRICADES AND CHANNELIZING DEVICES

Section 3F.01 Barricades

Standard:

When used to warn and alert road users of the terminus of a roadway in other than temporary traffic control zones, barricades shall meet the design criteria of Section 6F.63 for a Type III barricade, except that the colors of the stripes shall be retroreflective white and retroreflective red.

Option:

An end-of-roadway marker or markers may be used as described in Section 3C.04. Barricades may be used to mark any of the following conditions:

- A. A roadway ends;
- B. A ramp or lane closed for operational purposes; or
- C. The permanent or semipermanent closure or termination of a roadway.

Guidance:

Appropriate advance warning signs (see Chapter 2C) should be used.

Section 3F.02 Channelizing Devices

Option:

Channelizing devices, such as traffic cones and tubular markers, may be used for general traffic control purposes such as adding emphasis to reversible lane delineation, channelizing lines, or islands.

Standard:

~~Channelizing devices shall conform to Section 6F.58 and shall be a minimum of 450 mm (18 in) in height.~~

~~The minimum height of cones shall be 700 mm (28 in) for use on freeways and other high-speed roadways, and on all facilities when used during hours of darkness or whenever more conspicuous guidance is needed.~~

~~The color of channelizing devices used outside of temporary traffic control zones shall be either orange or the same color as the pavement marking that they supplement, or for which they are substituted.~~

~~For nighttime use, channelizing devices shall be retroreflective.~~

~~Retroreflection of tubular markers shall be a minimum of two 75 mm (3 in) white bands placed a maximum of 50 mm (2 in) from the top with a maximum of 150 mm (6 in) between the bands.~~

~~Retroreflection of cones shall be provided by a minimum 150 mm (6 in) white band placed a minimum of 75 mm (3 in) but no more than 100 mm (4 in) from the top.~~

~~Retroreflective material shall have a smooth, sealed outer surface that will display a similar color during both day and night.~~

~~When 700 mm (28 in) or larger size cones are used, the standard 150 mm (6 in) band shall be supplemented with an additional 100 mm (4 in) white band spaced a minimum of 50 mm (2 in) below the 150 mm (6 in) band.~~

Support:

In California, cones are used for temporary traffic control, not as permanent channelizing devices.

Guidance:

Channelizing devices should be kept clean and bright to maximize target value.

Support:

Channelizers are flexible retroreflective devices for installation within the roadway to discourage motorists from crossing a line or area of the roadway. Unlike delineators, which indicate the roadway alignment, channelizers are intended to provide additional guidance and/or restriction to traffic by supplementing pavement markings and delineation.

Option:

Channelizers may be used for additional emphasis to discourage median crossings at traffic islands and at lane separations.

Standard:

The design of a channelizer shall be as shown in Figure 3F-101(CA).

The retroreflective unit used on channelizers shall be a minimum of 75 x 300 mm (3 x 12 in). The 75 x 300 mm (3 x 24 in) minimum retroreflective unit shall be visible at 300 m (1000 ft) at night under illumination of legal high beam headlights, by persons with vision of or corrected to 20/20. Refer to Department of Transportation's Standard Specifications Section 12-3.07. See Section 1A.11 for information regarding this publication.

The post shall be flexible with a 57 mm (2 ¼ in) minimum width, except that the portion containing the retroreflective unit shall be a minimum width of 75 mm (3 in). The post shall be a minimum height of 900 mm (36 in) above the pavement on State highways.

Channelizer posts used for temporary traffic control shall be orange with white reflectors. See Section 6F.101(CA).

If the channelizers are to remain in place as a permanent roadway feature, the post shall be white and the color of the reflector shall conform to that of the pavement markings it supplements with the following exceptions:

- Retroreflective units used in narrow bridge shoulder tapers shall be yellow as shown in Figure 3D-104(CA).
- Retroreflective units shall be white when used in construction and maintenance zones (posts shall be orange). See Section 6F.101(CA).

Option:

At locations where speeds are 65 km/h (40 mph) or less a minimum post height of 700 mm (28 in) may be used.

Support:

Since channelizers require closer spacing, their post size requirements differ from those of delineators.

There are two basic types of channelizers: one attaches to the pavement and the other attaches to an anchoring device imbedded in the pavement. Both the base and anchor systems are designed to permit replacement of the channelizer post. See Figure 3F-101(CA).

Guidance:

Channelizers should be placed a minimum of 0.61 m (2 ft) from the traffic line, away from traffic, to allow for future maintenance of the line.

Option:

Space limitations may dictate exceptions to this criteria. At certain locations, placement directly on the traffic line may be required.

Support:

Spacing of the channelizers depends on the type of facility where they are to be used, the speed and volume of traffic, and the alignment to be channelized. Spacing which results in a visual fence/barrier effect is a key factor in channelizer installation.

Guidance:

The maximum post spacing should be 30 m (100 ft) on carpool lanes where channelizers are used primarily to delineate the separation between the carpool lane and the main facility.

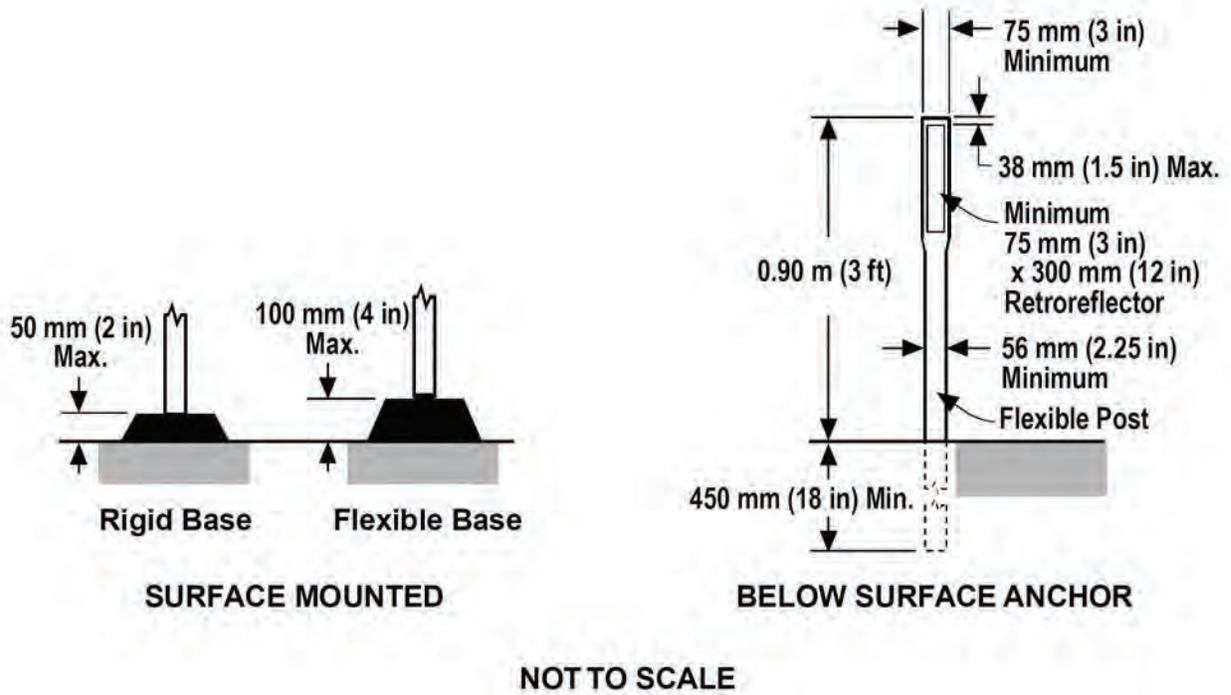
In locations where a relatively high number of violations occur, the post spacing should be 7.5 m (25 ft).

Option:

Where barrier violations are relatively minimal, a post spacing of 15 m (50 ft) may be adequate. However, spacing in excess of 15 m (50 ft) is of negligible value as a deterrent to intentional barrier violations.

Post spacing closer than 7.5 m (25 ft) may be considered on lower speed roads, urban streets and at specific locations such as traffic islands.

Figure 3F-101 (CA). Example of Channelizers



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CHAPTER 3G. ISLANDS

Section 3G.01 General

Support:

Chapter 3G addresses the characteristics of islands as traffic-control devices. Criteria for the design of islands are set forth in "A Policy on Geometric Design of Highways and Streets" (see Section 1A.11).

Standard:

An island for traffic control purposes shall be the defined area between traffic lanes for control of vehicular movements or for pedestrian refuge. Within an intersection area, a median or an outer separation shall be an island.

Option:

An island may be designated by pavement markings, channelizing devices, curbs, pavement edges, or other devices.

Support:

Raised channelization with sloping (mountable) curbed medians are used instead of channelization accomplished through the use of pavement markings (flush), for the following operating conditions:

- (a) Left- and right-turn lane treatments at intersections on all roadways with operating speeds of less than 65 km/h (40 mph).
- (b) Right-turn treatments on roadways with operating speeds equal to or greater than 65 km/h (40 mph).

On State highways, criteria for the design of islands are set forth in Department of Transportation's Highway Design Manual. See Section 1A.11 for information regarding this publication.

Section 3G.02 Approach-End Treatment

Guidance:

The ends of islands first approached by traffic should be preceded by a gradually diverging marking on the roadway surface, to guide vehicles into desired paths of travel along the island edge.

Option:

~~Approach end markings that can be readily crossed even at considerable speed may contain slightly raised (usually less than 25 mm (1 in) high) sections of coarse aggregate or other suitable materials to create rumble sections that provide increased visibility of the marked areas and that produce an audible warning to road users traveling across them.~~

Standard:

~~Rumble strips or other devices, when used in advance of islands having raised curbs, shall not be placed in such a manner as to constitute an unexpected obstacle.~~

Guidance:

~~Bars or buttons should not project more than 25 to 75 mm (1 to 3 in) above the pavement surface and should be designed so that any wheel encroachment within the area will be obvious to the vehicle operator, but will not result in loss of control of the vehicle.~~

Option:

~~Bars or buttons may be preceded by rumble sections, or their height may be gradually increased as approached by traffic.~~

~~Pavement markings may be used with raised bars to better designate the island area.~~

Support:

Use Section 3B.106(CA) for the rumble strips topic, instead.

Section 3G.03 Island Marking Application

Standard:

Markings, as related to islands, shall consist only of pavement and curb markings, object markers, and delineators.

On the approach to islands, the triangular neutral area in advance of the end of the island shall include pavement markings as described in Section 3B.10.

Option:

~~As indicated in Section 3G.02, rumble sections, or other similar traffic control designs which contrast with the pavement surface, may also be applied in the triangular neutral area in advance of the end of an island.~~

Guidance:

~~When raised bars or buttons are used in these neutral areas, they should be marked with white or yellow retroreflective materials, as determined by the direction or directions of travel they separate.~~

Support:

~~Use Section 3B.106(CA) for the rumble strips topic, instead.~~

Standard:

Double solid 100 mm (4 in) wide yellow lines shall be used to delineate the edge of a median island where the median is an all-paved, at-grade section of the highway. The island formed by double yellow lines shall be at least 0.61 m (2 ft) in width, as shown in Figure 3A-107(CA).

When used, other markings in the median island area shall be yellow.

Support:

This treatment is not intended for freeways or other highways with a positive barrier in the median. Single solid yellow left edge line and markers as shown in Figure 3A-105(CA) are standard.

The use of channelizing lines are shown in Figure 3A-112(CA) and no-passing markings are shown in Figures 3A-104(CA) and 3B-13.

Section 3G.04 Island Marking Colors

Guidance:

Islands outlined by curbs or pavement markings should be marked with retroreflective white or yellow material as determined by the direction or directions of travel they separate (see Section 3A.04).

The retroreflective area should be of sufficient length to denote the general alignment of the edge of the island along which vehicles travel, including the approach nose, when viewed from the approach to the island.

Option:

On long islands, curb retroreflection may be discontinued such that it does not extend for the entire length of the curb, especially if the island is illuminated or marked with delineators or edge lines.

Section 3G.05 Island Object Markers

Option:

Object markers may be installed alone or in combination with signs (such as KEEP RIGHT, KEEP LEFT, double arrows, or guide signs) located within the island.

Section 3G.06 Island Delineators

Standard:

~~Delineators installed on islands shall be the same colors as the related edge lines except that, when facing wrong-way traffic, they shall be red (see Section 3D.03).~~

Delineators installed on islands shall be the same colors as the related edge lines.

Support:

In California, red markers are used for wrong-way traffic, not delineators.

Standard:

Each roadway through an intersection shall be considered separately in positioning delineators to assure maximum effectiveness.