

California Manual on Uniform Traffic Control Devices

FHWA's MUTCD 2009 Edition, including Revisions 1 & 2 as amended for use in California.

2014 Edition

Revision 4 (March 29, 2019)

State of California
California State Transportation Agency
Department of Transportation



2000-2001

2001-2002

The following are the list of changes incorporated in 2014 CA MUTCD Revision 4. Text additions or changes to CA MUTCD Revision 4, published on March 29, 2019, are highlighted in yellow and identified by a grey-color bar along the left side of the paragraph. Deletions are shown in red strikethrough text.

- Introduction: Revised text explaining the format of the CA MUTCD

- 102a The California MUTCD uses a format similar to the National MUTCD. It incorporates National MUTCD in its entirety and explicitly shows which portions thereof are applicable or not applicable in California. The unedited National MUTCD text is shown in "Times New Roman" font with black color. Text portions of the National MUTCD content that are not applicable in California are shown with a strikethrough and a blue margin line on the right. The California text additions, including new paragraphs, and enhancements are incorporated into the combined document at appropriate locations and shown in an "Arial Narrow" font with blue color and a blue margin line on the right to keep them distinct from the National MUTCD content. Changes or additions to text, figures and tables in Revision 1 of the California MUTCD, effective December 9, 2015, are shown with an orange-color margin line on the left. Changes or additions to text, figures and tables in Revision 2 of the California MUTCD, effective April 7, 2017, are shown with a green-color margin line on the left. Changes or additions to text, figures and tables in Revision 3 of the California MUTCD, effective March 9, 2018, are shown with a purple-color margin line on the left. Changes or additions to text, figures and tables in Revision 4 of the California MUTCD, effective March 29, 2019, are shown with a gray-color margin line on the left.

- Introduction: Update to Table I-1(CA) Evolution of the California MUTCD

2019	California MUTCD, Revision 4 Department of Transportation, Division of Traffic Operations
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- Chapter 1A: Update to Table 1A-101(CA)-IA 21 is added to the table

Table 1A-101(CA). Status of Interim Approvals Issued By FHWA in California

No.	Description	Date Issued by FHWA	Date Adopted in CA
IA-21	Interim Approval for the Optional Use of Pedestrian-Actuated Rectangular Rapid-Flashing Beacons at Uncontrolled Marked Crosswalks	3/21/18	4/9/18

- Chapter 2B – Regulatory Signs, Barricades, and Gates: New text is highlighted in yellow. R39-3(CA) sign has been added to Figure 2B-24(CA). Table 2B-1 (Sheet 3 and sheet 6) has been updated. Updated cells in the table are highlighted in yellow.

Section 2B.46 Parking, Standing, and Stopping Signs (R7 and R8 Series)

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Option:

⁸⁹ The Rest Area/Vista Point 8 HOUR PARKING (S23(CA)) sign may be used to discourage extended stays in roadside rests or vista points for noncommercial vehicles. The 10 HOUR PARKING COMMERCIAL MOTOR VEHICLES (R39-3(CA)) may be used to allow ten total hours of parking for commercial vehicles. See CVC 22651(s)1 and CVC 22651(s)2.

Figure 2B-24 (CA). Parking and Standing Signs and Plaques (R7 Series) (Sheet 3 of 3)

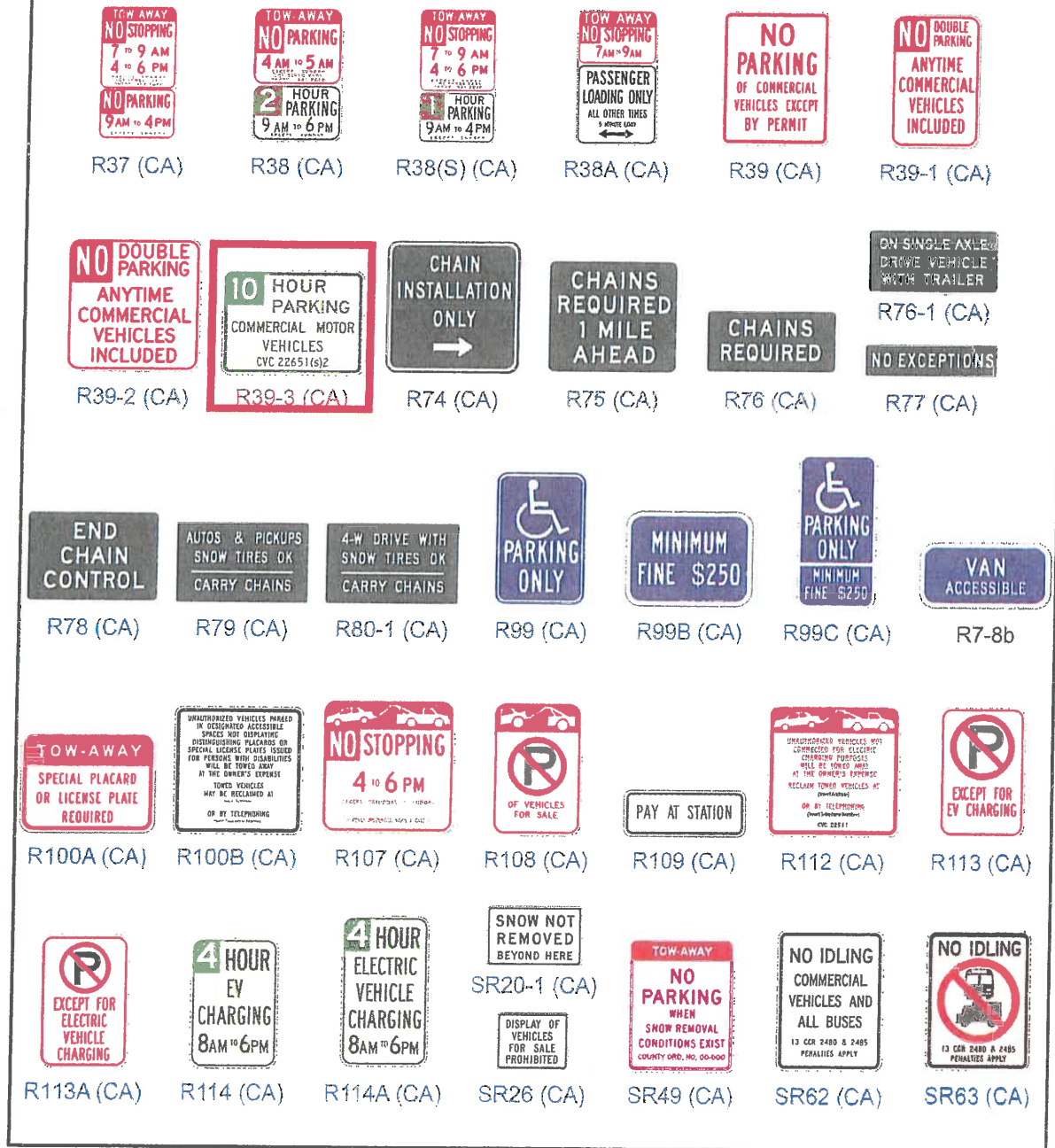


Table 2B-1(CA). California Regulatory Sign and Plaque Sizes (Sheet 3 of 7)

Sign or Plaque	Sign Designation	Section	Conventional Road		Expressway	Freeway	Minimum	Oversized
			Single Lane	Multi-Lane				
30 MINUTE PARKING 2AM TO 6AM DISTRICT 3 PERMITS EXEMPT	R32D(CA)	2B.46	12 x 18	12 x 18	---	---	---	---
2 HOUR PARKING 8AM TO 4PM - PASSENGER LOADING ONLY 4PM TO MIDNIGHT 5 MINUTE LIMIT w/ Double Arrow	R32E(CA)	2B.46	18 x 30	18 x 30	---	---	---	---
2 HOUR PARKING 8AM TO 6PM MOTORCYCLE PARKING ONLY w/ Double Arrow	R32F(CA)	2B.46	12 x 18	12 x 18	---	---	---	---
NO LEFT TURN Specific Hours	R33(CA)	2B.18	24 x 36	24 x 36	---	---	---	---
NO LEFT TURN Specific Hours	R33A(CA)	2B.18	30 x 48	30 x 48	30 x 48	---	---	---
Commercial Vehicle Weight Exclusion	R36(CA)	2B.59	24 x 24	24 x 24	---	---	---	---
Tow-Away No Stopping/Limited Hour Parking Specific Hours	R37(CA)	2B.46	18 x 31	18 x 31	---	---	---	---
Tow-Away No Parking/Limited Hour Parking Specific Hours	R38(CA)	2B.46	14 x 20.5	14 x 20.5	---	---	---	---
Tow-Away No Stopping/Limited Hour Parking Specific Hours	R38(S)(CA)	2B.46	18 x 31	18 x 31	---	---	---	---
TOW-AWAY NO STOPPING 7AM TO 9AM - PASSENGER LOADING ONLY ALL OTHER TIMES 5 MINUTE LIMIT w/ Double Arrow	R38A(CA)	2B.46	18 x 30	18 x 30	---	---	---	---
NO PARKING OF COMMERCIAL VEHICLES EXCEPT BY PERMIT	R39(CA)	2B.46	24 x 30	24 x 30	---	---	---	---
NO DOUBLE PARKING ANYTIME COMMERCIAL VEHICLES INCLUDED	R39-1(CA)	2B.46	12 x 18	12 x 18	---	---	---	---
NO DOUBLE PARKING ANYTIME COMMERCIAL VEHICLES INCLUDED	R39-2(CA)	2B.46	18 x 18	18 x 18	---	---	---	---
10 HOUR PARKING COMMERCIAL MOTOR VEHICLES	R39-3(CA)	2B.46, 2I.05	24 x 18	24 x 18	---	---	---	---
TWO WAY TRAFFIC AHEAD	R40(CA)	2B.102	24 x 30	24 x 30	---	---	---	---
\$1000 FINE FOR LITTERING	R47(CA)	2B.103	52 x 36	52 x 36	52 x 36	52 x 36	---	---
\$1000 FINE FOR ANIMAL ABANDONMENT	R47A(CA)	2B.103	54 x 36	54 x 36	54 x 36	54 x 36	---	---
SPEED ENFORCED BY RADAR	R48(CA)	2B.110	24 x 30	24 x 30	36 x 48	48 x 60	18 x 24	---
RADAR ENFORCED	R48-1(CA)	2B.13	36 x 18	36 x 18	48 x 24	48 x 24	24 x 12	---
SPEED ENFORCED BY AIRCRAFT	R48-2(CA)	2B.13	24 x 30	24 x 30	36 x 48	48 x 60	18 x 24	---
NO PED CROSSING, USE CROSSWALK	R49(CA)	2B.51	42 x 18	42 x 18	---	---	---	---
END TRUCK LANE	R53A(CA)	2B.31	36 x 36	36 x 36	48 x 48	48 x 48	24 x 24	---
TRUCKS RIGHT LANE ONLY	R53B(CA)	2B.31	36 x 48	36 x 48	48 x 60	48 x 60	24 x 30	---
AUTOS WITH TRAILERS - TRUCKS - PROHIBITED	R53D(CA)	2B.39	---	---	66 x 72	66 x 72	---	---
END TRUCK LANE CONTROL	R53E(CA)	2B.31	36 x 48	36 x 48	48 x 60	48 x 60	24 x 30	---
YIELD TO UPHILL TRAFFIC	R55(CA)	2B.31	---	---	48 x 54	48 x 54	---	---
BEGIN FREEWAY	R57(CA)	2B.49	---	---	48 x 26	48 x 26	---	---
END FREEWAY	R58(CA)	2B.48	---	---	48 x 26	48 x 26	---	---
Optional Movement Lane Control	R60B(CA)	2B.21	54 x 48	54 x 48	---	---	---	---
Intersection Lane Control	R61-1(CA)	2B.19	30 x 30	45 x 45	---	---	30 x 30	---
Intersection Lane Control	R61-3(CA)	2B.19	30 x 30	45 x 45	---	---	30 x 30	---
Intersection Lane Control	R61-5(CA)	2B.19	36 x 30	54 x 45	---	---	36 x 30	---
Intersection Lane Control	R61-7(CA)	2B.19	36 x 30	54 x 45	---	---	36 x 30	---

Table 2B-1(CA). California Regulatory Sign and Plaque Sizes (Sheet 6 of 7)

Sign or Plaque	Sign Designation	Section	Conventional Road		Expressway	Freeway	Minimum	Oversized
			Single Lane	Multi-Lane				
NO HOUSEHOLD GARBAGE	SR23-1(CA)	2B.106	26 x 18	26 x 18	---	---	---	---
TRANSPORTING ILLEGAL FIREWORKS PROHIBITED	SR25(CA)	2B.63	84 x 42	84 x 42	108 x 54	108 x 54	84 x 42	---
DISPLAY OF VEHICLES FOR SALE PROHIBITED	SR26(CA)	2B.46	30 x 24	30 x 24	---	---	---	---
LEFT TURN ON GREEN ARROW ONLY - NO U TURN	SR39A(CA)	2B.53	36 x 48	36 x 48	---	---	---	---
LEFT OR U TURN ON GREEN ARROW ONLY	SR39A(U)(CA)	2B.53	42 x 24	42 x 24	---	---	---	---
Width Limit	SR40(CA)	2B.60	---	---	60 x 78	60 x 78	48 x 60	---
ALL BUSES STOP AT SCALES	SR41(CA)	2B.60	---	---	84 x 48	84 x 48	---	---
ALL BUSES with Arrow	SR42(CA)	2B.60	---	---	54 x 54	54 x 54	---	---
GOLF CARTS OK DAYLIGHT HOURS	SR43(CA)	2B.107	18 x 24	18 x 24	---	---	---	---
Bus and Truck Registration	SR44(CA)	2B.108	72 x 42	72 x 42	---	---	---	---
EMERGENCY ACCESS KEEP CLEAR	SR46(CA)	2B.109	24 x 30	24 x 30	---	---	---	---
OFF HIGHWAY VEHICLES COMBINED USE NEXT (X) MILES	SR47(CA)	2B.110	48 x 48	48 x 48	---	---	---	---
NO OFF HIGHWAY VEHICLES BEYOND THIS POINT	SR48(CA)	2B.110	48 x 48	48 x 48	---	---	---	---
TOW-AWAY NO PARKING WHEN SNOW REMOVAL CONDITIONS EXIST	SR49(CA)	2B.46	36 x 45	36 x 45	---	---	18 x 24	---
SPECIAL DRIVING ZONE BEGINS HERE - DOUBLE FINE ZONE	SR53(CA)	2B.17	48 x 48	48 x 48	72 x 72	72 x 72	48 x 48	---
DOUBLE FINE ZONE	SR54(CA)	2B.17	30 x 30	30 x 30	42 x 42	42 x 42	30 x 30	---
SPECIAL DRIVING ZONE ENDS HERE	SR55(CA)	2B.17	48 x 30	48 x 30	72 x 42	72 x 42	48 x 30	---
Traffic Signal PHOTO ENFORCED	SR56(CA)	2B.55	36 x 54	36 x 54	48 x 72	48 x 72	30 x 42	---
ALL TRUCKS - 2 AXLE AND MORE - STOP AT SCALE	SR57(CA)	2B.60	84 x 18	84 x 18	120 x 30	144 x 36	84 x 18	---
RED LIGHT VIOLATION \$____ FINE	SR58(CA)	2B.55	30 x 36	30 x 36	36 x 48	36 x 48	30 x 36	---
MINOR CRASH NO INJURIES -- SAFELY MOVE VEHICLES FROM TRAVEL LANES	SR61(CA)	2B.65	96 x 66	96 x 66	96 x 66	96 x 66	96 x 66	---
NO IDLING COMMERCIAL VEHICLES AND ALL BUSES	SR62 (CA)	2B.55	18 x 24	18 x 24	---	---	---	---
NO IDLING All Buses and Commercial Vehicles	SR63 (CA)	2B.55	18 x 24	18 x 24	---	---	---	---
FREEWAY - ACCESS RIGHTS RESTRICTED ON THIS SECTION OF HIGHWAY	S3-1(CA)	2B.39	30 x 24	30 x 24	---	---	---	---
STATE PROPERTY - NO DUMPING - NO PARKING - NO TRESPASSING	S8(CA)	2B.111	36 x 22	36 x 22	---	---	---	---
STATE PROPERTY - ANY PERSON REMOVING OR MOLESTING SAME WILL BE PROSECUTED	S20(CA)	2B.111	24 x 18	24 x 18	---	---	---	---
Weigh Station Repair Service plaque	S21(CA)	2B.60	36 x 24	36 x 24	---	---	---	---
Rest Area/Vista Point 8 HOUR PARKING	S23(CA)	2B.46, 21.05	24 x 24	24 x 24	---	---	---	---

- Chapter 2D – Guide Signs-Conventional Roads: Yellow highlighted text is being added, and red strikethrough text is being deleted. Table 2D-1(CA) and Table 2D-102(CA) have been updated.
Section 2D.37 Destination Signs (D1 Series)

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28 The Veterans National Cemetery (G86-14(CA)) or the Veterans Home of California (G86-16(CA)) Signs may be placed, one in each direction of travel from and on the nearest State highway, based upon a request from the Federal Department of Veterans Affairs.

Table 2D-1(CA). California Conventional Road Guide Sign Sizes (Sheet 2 of 2)

Sign or Plaque	Sign Designation	Section	Conventional Road	Minimum	Oversized
Exit Numbered Supplemental Destination	G86-13(CA)	2D.37	VAR x 78	VAR x 78	VAR x 90
Veterans National Cemetery Sign	G86-14(CA)	2D.37	VAR x 72 66	---	---
Veterans Home of California	G86-16(CA)	2D.37	VAR x 66	---	---
PARK - RIDE	G95A(CA)	2D.48	96 x 42	96 x 42	108 x 48
PARK - RIDE NEXT RIGHT	G95B(CA)	2D.48	96 x 60	96 x 60	108 x 72
Park - Ride Courtesy Plaque	G95B-1(CA)	2D.48	96 x 18	96 x 18	108 x 24
BUS SERVICE Plaque	G95D(CA)	2D.48	96 x 24	96 x 24	108 x 30
Park - Ride Plaque	G95E(CA)	2D.48	96 x 18	96 x 18	120 x 24
Intersection Number	G98(CA)	2D.102(CA)	18 x 12	---	---
NO PICKUPS	SG8(CA)	2D.49	84 x 18	84 x 18	120 x 24
Caltrans Facility Entrance	SG26(CA)	2D.103(CA)	72 x 36	---	---
STATE PROPERTY	S1-1(CA)	2D.103(CA)	21 x 15	---	---
Inventory Marker (Survey)	S2(CA)	2D.101(CA)	3.5 x 12	---	---
NO LOITERING, CAMPING, VENDING OR PARKING OF VEHICLES 30 FEET OR LONGER	S22(CA)	2D.48	24x24	24x24	---
VEHICLE INSPECTION ONLY, NO LOITERING OR CAMPING	S22-1(CA)	2D.49	48 x 15	---	---
Caltrans CONSTRUCTION FIELD OFFICE	S27(CA)	2D.103(CA)	36 x 24	---	---

Table 2D-102 (CA). Criteria for Supplemental Destination Signs

Type of Destination	Specific Criteria	Major Metropolitan Areas	Urbanized Areas	Rural Areas
Post Secondary School, Public or Private	Minimum Enrollment (Single Campus Locations, See Note 5). Maximum Miles from a Freeway (See Note 6).	1,000 2	1,000 4	1,000 5
Museum, Zoo, Stadium or Sports Arena	Public Owned and Non-Profit. Minimum Annual Attendance. Maximum Miles from Highway (See Note 2).	1,000,000 2	500,000 2	200,000 3
Convention Center	Public Owned and Non-Profit. Minimum Annual Attendance. Maximum Miles from Highway (See Note 2).	500,000 3	250,000	-
Military Base	Number of Employees and Permanent Garrison. Maximum Miles from Highway.	5,000 2	5,000 4	5,000 7
National Guard Armory	Only Emergency Center in the Area. Easy Access to Primary Evacuation Route. (See Note 2).	-	-	-
Fairgrounds	Publicly Owned and Operated. Temporary Sign Only, Unless There are Year Round Activities. Minimum Annual Attendance. Maximum Miles from Highway (See Note 2).	500,000 2	200,000 4	200,000 5
Federal or State Hospitals, Prisons, National Cemeteries and Veterans Home	Maximum Miles from Highway (See Note 2).	1	3	5
Government Centers	Number of Employees. Maximum Miles from Highway (See Note 2).	5,000 2	2,000 3	1,000 5
California Welcome Centers	Easy Access from Nearest State Highway. (See Notes 2 and 7)	-	-	-
Airports	Maximum Miles from Highway (See Note 2).	1	3	5
Rail and Light Rail Stations	Easy Access from Nearest State Highway. (See Note 2).	-	-	-

NOTES: 1. Meeting the above criteria does not guarantee placement of a sign. Limitations on the spacing between sign and the number of messages permitted, specified in Sections 2A.16, 2D.07 and 2D.40, shall be observed and eligible destinations must compete for signing on the basis of traffic service.

2. Follow-up signing, if necessary, shall be installed by local agencies before signs are placed on the State Highway.

3. If a stadium is located at a school campus for which signs are already provided, separate stadium sign will not be placed.

4. Definitions of Area Classifications:

A. MAJOR METROPOLITAN AREA - An urbanized area, population density of at least 1,000 inhabitants per 2.6 km² (1 mi²), not necessarily related to county boundaries, with a total population of at least 1,000,000 and an included central city with a population of at least 250,000.

B. URBANIZED AREA - An urbanized area with a total population of at least 50,000 and an included central city with no minimum population.

C. RURAL AREA - All areas outside of an urbanized area.

5. Public or private postsecondary education institution shall have an enrollment of either 1,000 or more full-time students or an equivalent in part-time students. Refer to CVC Section 21375.

6. No signs to school will be erected until funds from private sources covering the cost of the signs and their installation. If a school, which previously had signs, relocates to contribute to the improvement of the school (as determined by the California Department of Transportation), signs will be erected at the new location at no cost to the school.

7. The California Department of Transportation will charge the Welcome Center directly for the cost of the signs and their installation on the State highway. Cost for sign installation on local roads is the responsibility of the Welcome Center and the local agency.

- Chapter 2I – General Service Signs: New text is highlighted in yellow. R39-3(CA) sign has been added to Figure 2I-5(CA). Table 2I-1 has been updated

Section 2I.05 Rest Area and Other Roadside Area Signs

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Option

24 The Rest Area/Vista Point 8 HOUR PARKING (S23(CA)) sign may be used to discourage extended stays in roadside rests or vista points for noncommercial vehicles. The 10 HOUR PARKING COMMERCIAL MOTOR VEHICLES (R39-3(CA)) may be used to allow ten total hours for parking for commercial vehicles. See CVC 22651(s)1 and CVC 22651(s)2.

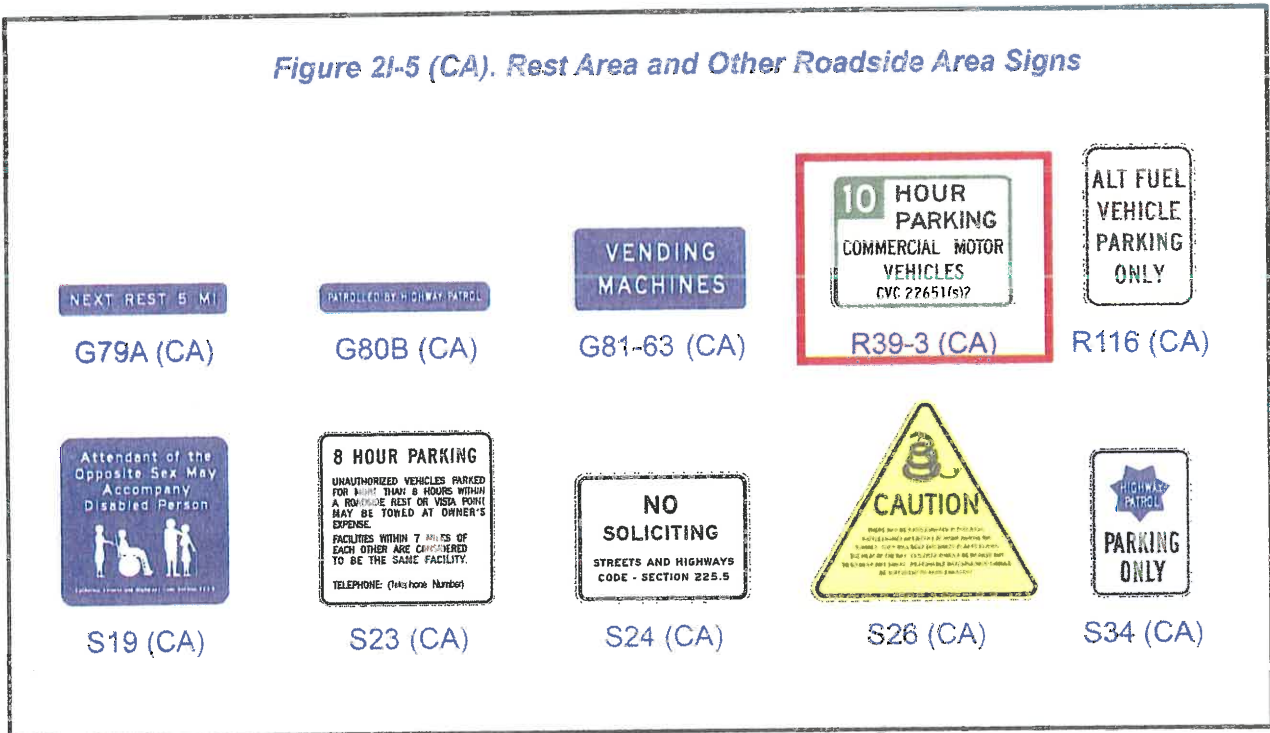


Table 2I-1(CA). California General Service Sign and Plaque Sizes (Sheet 2 of 2)

Sign or Plaque	Sign Designation	Section	Conventional Road	Freeway or Expressway
Highway Patrol	G66-57(CA)	2I.03	24 x 24	30 x 30
BRAKE CHECK AREA	G66-58(CA)	2I.06	VAR x 36	VAR x 42
BRAKE CHECK AREA with Arrow	G66-59(CA)	2I.06	VAR x 42	VAR x 54
BRAKE CHECK AREA (X MILE)	G66-60(CA)	2I.06	VAR x 48	VAR x 66
Sheriff	G66-61(CA)	2I.03	24 x 24	30 x 30
Police	G66-62(CA)	2I.03	24 x 24	30 x 30
NEXT REST (X MILE)	G79A(CA)	2I.05	72 x 12	144 x 24
PATROLLED BY HIGHWAY PATROL	G80B(CA)	2I.05	72 x 12	144 x 24
TOURIST INFORMATION	G81-21(CA)	2I.08	144 x 24	204 x 30
TOURIST INFORMATION	G81-24(CA)	2I.08	96 x 42	132 x 48
LP GAS	G81-52(CA)	2I.03	24 x 6	30 x 8
EMERGENCY CALL 9-1-1	G81-61(CA)	2I.09	VAR x 6	VAR x 18
EMERGENCY CALL 9-1-1	G81-62(CA)	2I.09	36 x 18	60 x 30
VENDING MACHINES	G81-63(CA)	2I.05	36 x 18	48 x 30
WHEN FLASHING	G81-64A(CA)	2I.09	84 x 12	108 x 18
Radio-Recreation Information	G81-65(CA)	2I.09	84 x 48	108 x 66
REPORT DRUNK DRIVERS CALL 911	G81-66(CA)	2I.09	36 x 36	48 x 48
ALT FUEL VEHICLE PARKING ONLY	R116(CA)	2I.05	12 x 18	---
Ridesharing Information	SG19(CA)	2I.11	48 x 30	72 x 42
Park & Ride Facility Information	SG20(CA)	2I.11	48 x 36	66 x 54
Call Box	SG25(CA)	2I.03	18 x 24	30 x 36
Call Box Adoption Plaque	SG25A(CA)	2I.03	18 x 12	30 x 18
CAL FIRE STATION NEXT RIGHT	SG38(CA)	2I.03	78 x 30	102 x 36
CAL FIRE STATION with Arrow	SG39(CA)	2I.03	48 x 21	60 x 30
END CALL BOXES	SG41(CA)	2I.03	36 x 36	48 x 48
CALIFORNIA WELCOME CENTER X MILES	SG47A(CA)	2I.08	66 x 48	108 x 66
CALIFORNIA WELCOME CENTER NEXT RIGHT	SG47B(CA)	2I.08	66 x 48	108 x 66
CALIFORNIA WELCOME CENTER with Arrow	SG47C(CA)	2I.08	42 x 24	54 x 30
CALIFORNIA WELCOME CENTER X MILES with Arrow	SG47D(CA)	2I.08	42 x 28	54 x 36
TRAVEL INFO CALL 511	SG49A(CA)	2I.10	42 x 54	54 x 72
Fire Hydrant Street Name	S9(CA)	2I.03	12 x 18	---
Fire Hydrant with Distance and Arrow	S10(CA)	2I.03	18 x 12	---
Opposite Sex Attendant	S19(CA)	2I.05	12 x 12	---
Rest Area/Vista Point 8 HOUR PARKING	S23(CA)	2B.46, 2I.05	24 x 24	---
NO SOLICITING	S24(CA)	2I.05	24 x 18	---
Rattlesnakes Caution	S26(CA)	2I.05	26.75 x 23.5	---
Highway Patrol PARKING ONLY	S34(CA)	2I.05	12 x 18	---
10 HOUR PARKING COMMERCIAL MOTOR VEHICLES	R39-3(CA)	2B.46, 2I.05	24 x 18	---

- Chapter 6F – Temporary Traffic Control Devices: Yellow highlighted text is being added, and red strikethrough text is being deleted.
Figure 6F-101(CA) has been updated.

Section 6F.109(CA) Construction Project Funding Identification ~~(C47(CA) Series)~~ Signs

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Option:

04 The C48 (CA) sign may be used on projects funded by Senate Bill 1. Formats of this sign are flexible to include federal, state and/or local agency funding sources. See Figure 6F-101(CA).

Figure 6F-101 (CA). California Temporary Traffic Control Signs (Sheet 2 of 2)



C47A (CA)



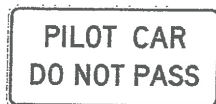
C47B (CA)



C48 (CA)



R111 (CA)



R115 (CA)



SC3 (CA)



SC5 (CA)



SC6A (CA)



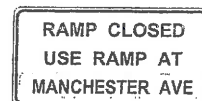
SC6B (CA)



SC6-3 (CA)



SC6-4 (CA)



SC7 (CA)



SC8 (CA)



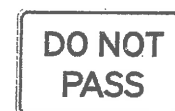
SC9 (CA)



SC10 (CA)



SC11 (CA)



SC13 (CA)



SC15 (CA)



SC18 (CA)



SC19 (CA)



SC20 (CA)



SC21 (CA)

- Chapter 2D – Guide Signs – Conventional Roads: New text is highlighted in yellow.

Section 2D.43 Street Name Signs (D3-1 or D3-1a)

Guidance:

01 Street Name (D3-1 or D3-1a or G7-1(CA)) signs (see Figure 2D-10 and 2D-10(CA)) should be installed in urban areas at all street intersections regardless of other route signs that might be present and should be installed in rural areas to identify important roads that are not otherwise signed.

Support:

01a Refer to Section 9B.20 for signage at street and Class I bikeway intersections.

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- Chapter 9B– Signs: Proposed text is highlighted in yellow. Proposed strikethrough federal text is highlighted in yellow.

Section 9B.20 Bicycle Guide Signs (D1-1b, D1-1c, D1-2b, D1-2c, D1-3b, D1-3c, D11-1, D11-1c, D3-1, D3-1a and G7-1(CA))

Option:

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04 Destination (D1-1, D1-1a) signs, ~~Street Name (D3) signs,~~ or Bicycle Destination (D1-1b, D1-1c, D1-2b, D1-2c, D1-3b, D1-3c) signs (see Figure 9B-4) may be installed to provide direction, destination, and distance information as needed for bicycle travel. If several destinations are to be shown at a single location, they may be placed on a single sign with an arrow (and the distance, if desired) for each name. If more than one destination lies in the same direction, a single arrow may be used for the destinations.

Guidance:

01a Street Name (D3-1 or D3-1a or G7-1(CA)) signs should be installed at all street and Class I bikeway intersections and at all Class I bikeway intersections.

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New Section in Chapter 9B:

Section 9B.104 (CA) Signs on Overcrossing Structures

Support:

01 Signage identifying overcrossing structures over a Class I bikeway can be useful in orienting bikeway users.

02 Consider the skew of the structure (greater than 45 degrees), height of the overcrossing structure, and other pertinent factors while determining the feasibility of installing the sign.

Option:

03 Street Name (D3-1 or D3-1a or G7-1(CA)) signs identifying the overcrossing structure over a Class I bikeway may be installed on the overcrossing structure. If sign installation on the overcrossing is not practical, roadside sign installation may be considered.

Guidance:

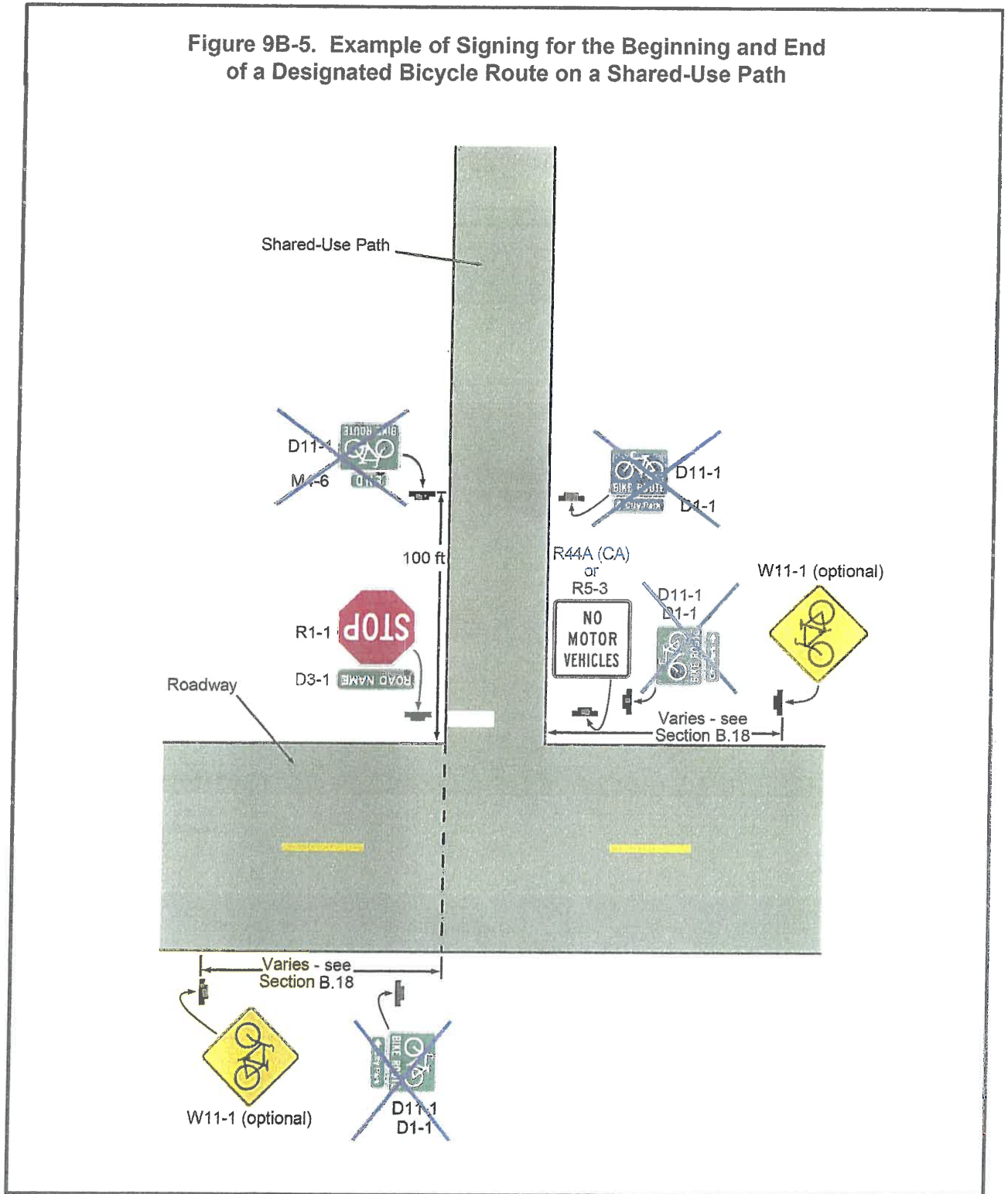
04 Structural analysis should be considered prior to installation of signs on the overcrossing structure.

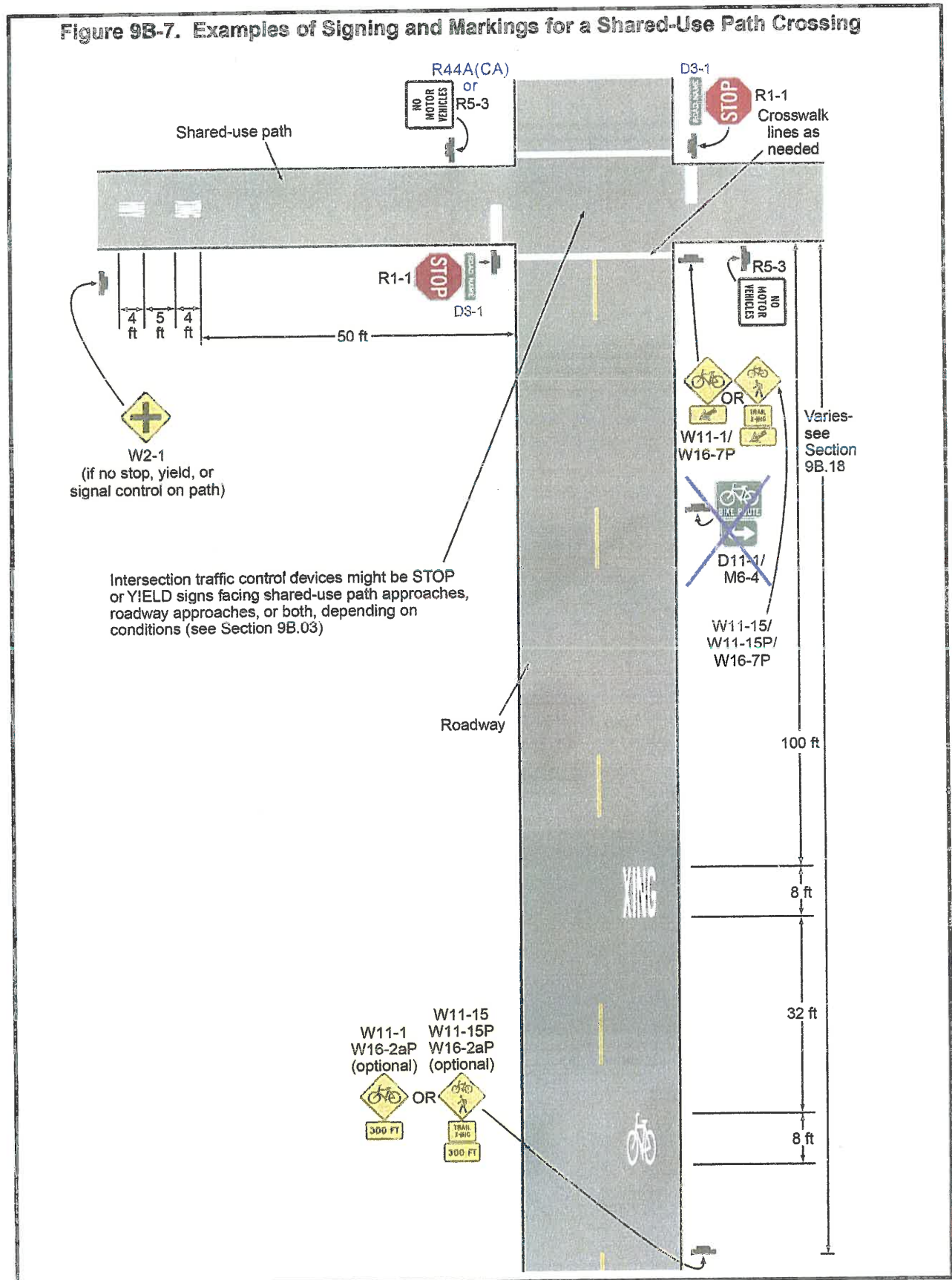
Standard:

05 Encroachment permits shall be required for a local agency to install signs on overcrossing structures within State right-of-way.

In Figure 9B-5 and Figure 9B-7, D3-1 sign is being proposed to be added. D11-1 signs are being crossed out as the figures indicate a Class I bikeway and not a Class III bikeway (bike route)

Figure 9B-5. Example of Signing for the Beginning and End of a Designated Bicycle Route on a Shared-Use Path





EDITORIAL CHANGES

- Chapter 2B- Regulatory Signs, Barricades, and Gates: Policy text is being changed to be consistent with the figures. Yellow highlighted text is being added, and red strikethrough text is being deleted.

Section 2B.41 Wrong-Way Traffic Control at Interchange Ramps

Support:

.....

¹⁹ Freeway Entrance package is a vertical arrangement of FREEWAY ENTRANCE (D13-3) sign, cardinal direction, route shield, ~~cardinal direction~~, and arrow signs on a single post in which the D13-3 sign is on top and the arrow is on the bottom.

.....

- Chapter 2B- Regulatory Signs, Barricades, and Gates: Policy text is being changed to be consistent with the R110(CA) Sign. Yellow highlighted text is being added and red strikethrough text is being deleted.

Section 2B.112(CA) MOVE OVER OR SLOW FOR STOPPED EMERGENCY AND MAINTENANCE VEHICLES Sign (R110(CA))

Option:

⁰¹ The MOVE OVER OR SLOW **WHEN FOR** STOPPED EMERGENCY AND MAINTENANCE VEHICLES (R110(CA)) Sign (see Figure 2B-32(CA)) may be used to inform drivers of the State's MOVE OVER Law, CVC 21809. This sign may be used only within freeway facilities.

- Chapter 2D- Guide Signs-Conventional Roads: Policy text is being changed as it is no longer applicable. Red strikethrough text is being deleted.

Section 2D.101(CA) Inventory Markers

.....

Mile Post Markers (G11-7(CA)) on State Highways:

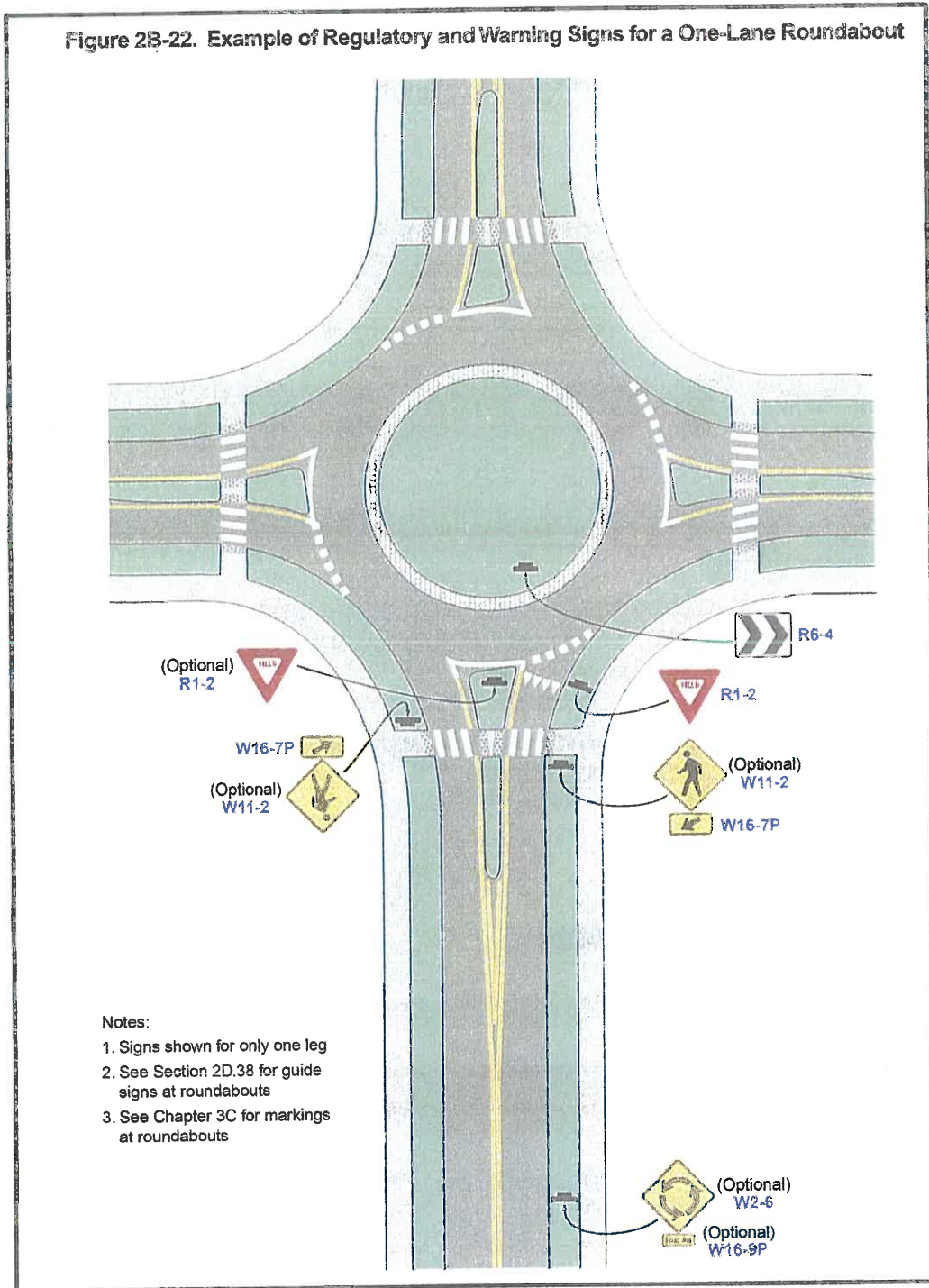
Support:

¹⁰ Refer to Caltrans' TASAS Manual for more details on this topic. See Section 1A.11 for information regarding this publication.

~~¹¹ This section, regarding Mile Post Markers (identified as "highway post markers" in Caltrans' Standard Plans), is for future application. It will apply after the field conversion of existing markers and conversion of the Highway Data Base.~~

¹² The existing markers in the field are in English units (miles). Installation of new markers, replacement of missing markers and correction (relocation) of existing markers will be done in English units (miles). ~~The previous policies of calculation, lateral placement, and spacing for two-lane roads and divided roads and rural and urban will remain effective until such time as a full field conversion program is applied.~~

- Chapter 2B- Regulatory Signs, Barricades, and Gates: Figure 2B-22 is being revised to show the correct code for Yield Sign (R1-2). Existing figure in the CA MUTCD incorrectly labels the Yield sign as Stop Sign (R1-1).



- Chapter 2E — Guide Signs for Freeways and Expressways: “Diagrammatic Sign” text under Arrow-per-Lane signs are being deleted from Figure 2E-4, Figure 2E-5 and Figure 2E-6.

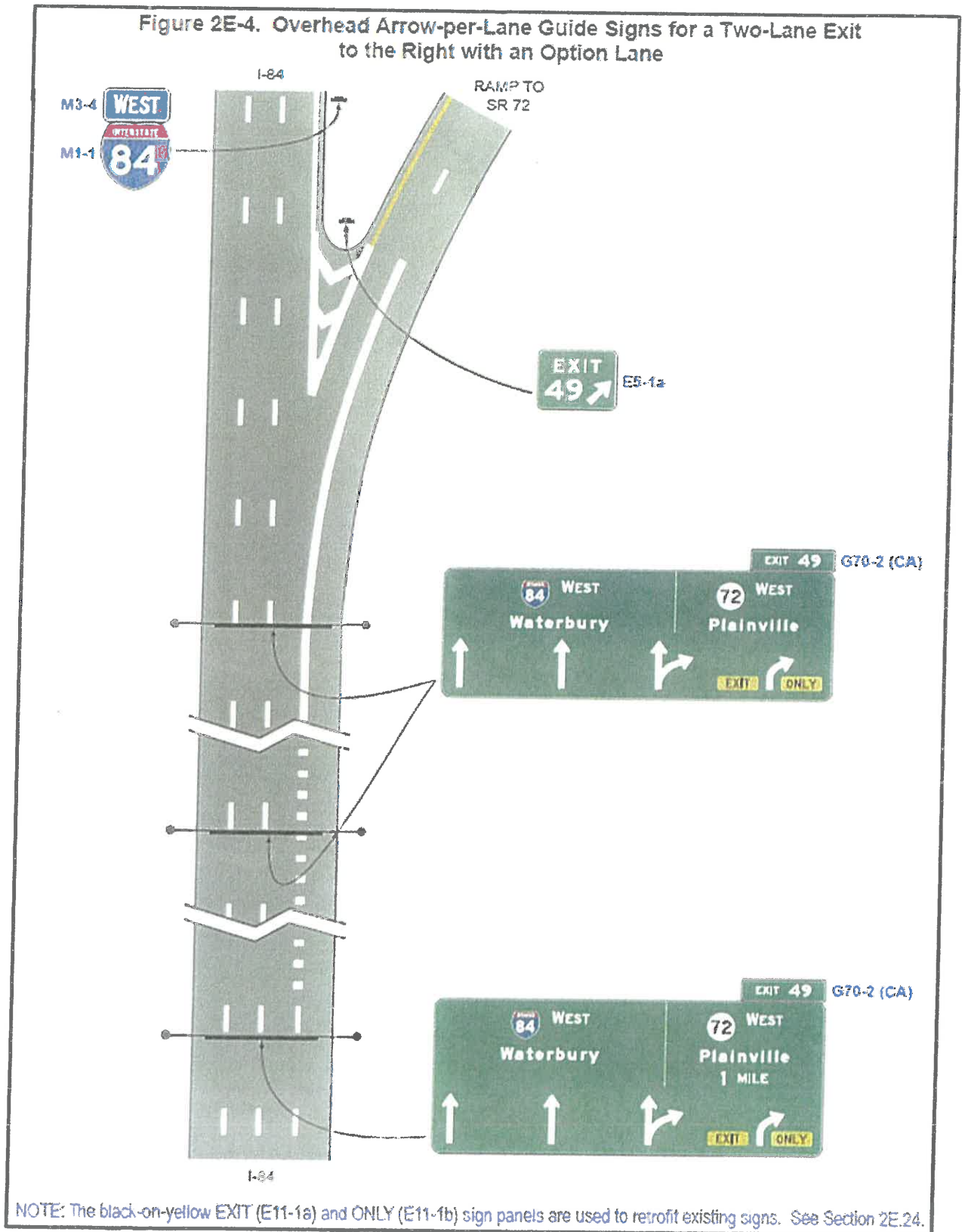
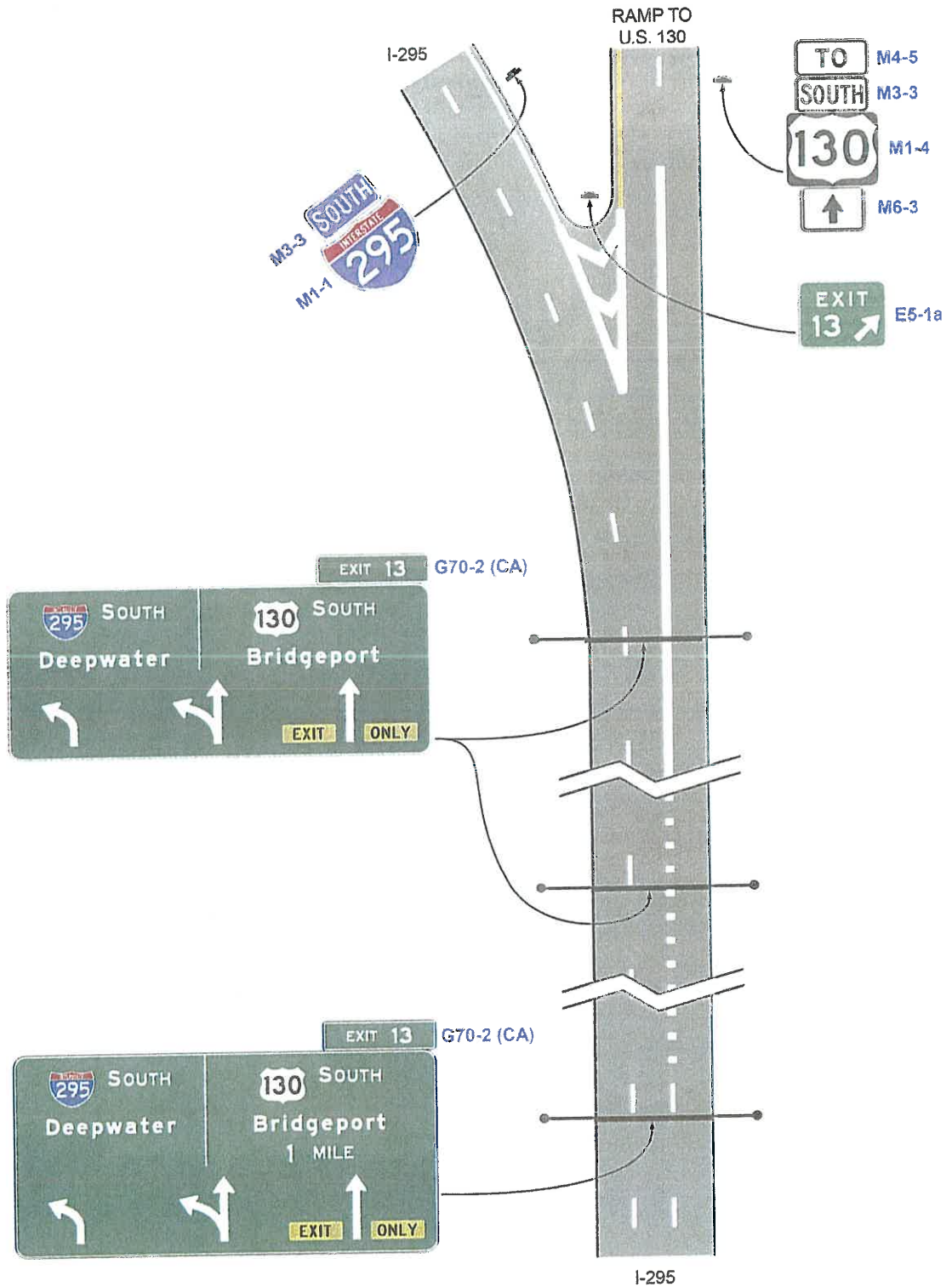
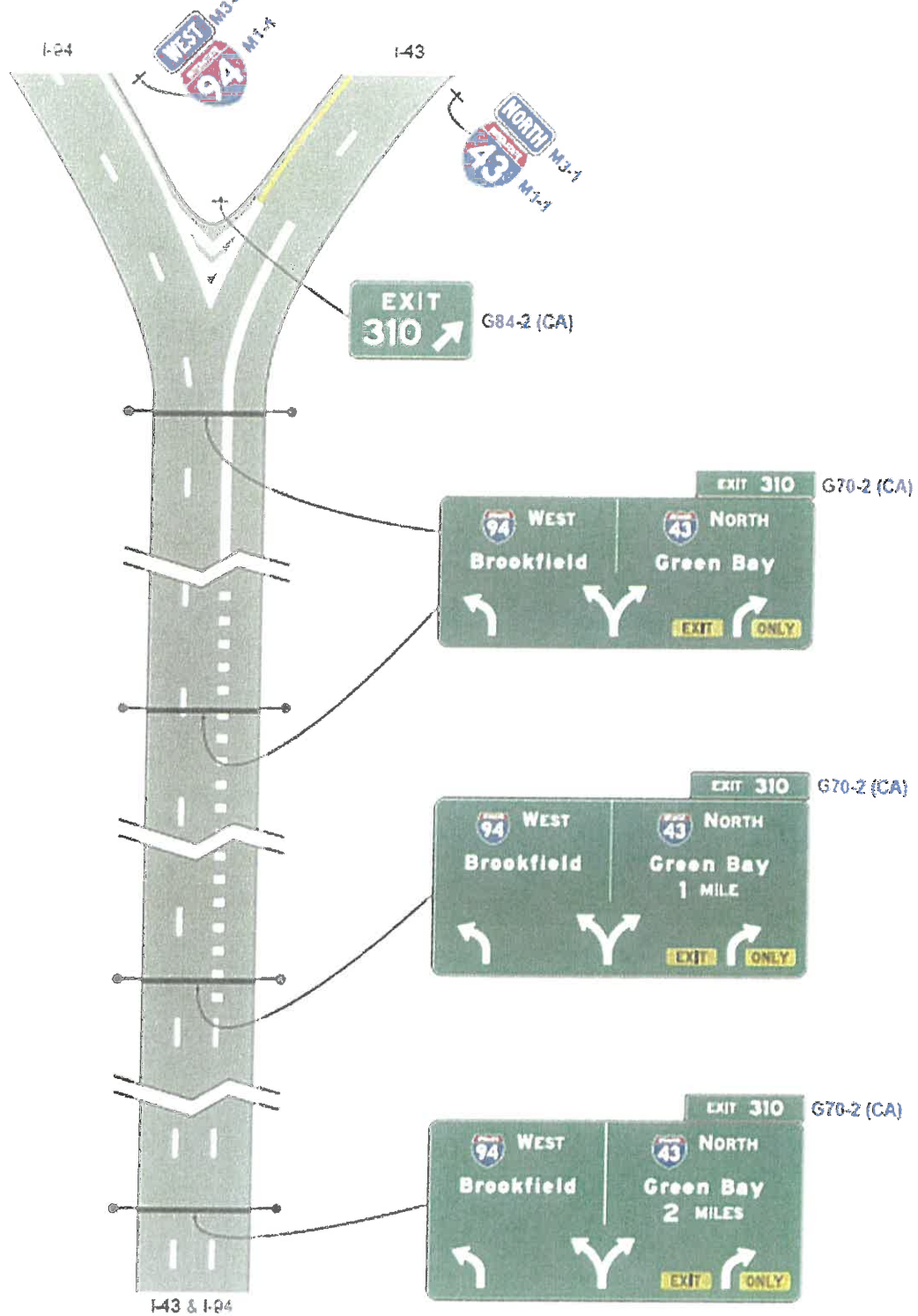


Figure 2E-5. Overhead Arrow-per-Lane Guide Signs for a Two-Lane Exit to the Right with an Option Lane (Through Lanes Curve to the Left)



NOTE: The black-on-yellow EXIT (E11-1a) and ONLY (E11-1b) sign panels are used to retrofit existing signs. See Section 2E.24.

Figure 2E-6. Overhead Arrow-per-Lane Guide Signs for a Split with an Option Lane



NOTE: The black-on-yellow EXIT (E11-1a) and ONLY (E11-1b) sign panels are used to retrofit existing signs. See Section 2E.24.

CHAPTER 6C. TEMPORARY TRAFFIC CONTROL ELEMENTS

Section 6C.01 Temporary Traffic Control Plans

Support:

⁰¹ A TTC plan describes TTC measures to be used for facilitating road users through a work zone or an incident area. TTC plans play a vital role in providing continuity of effective road user flow when a work zone, incident, or other event temporarily disrupts normal road user flow. Important auxiliary provisions that cannot conveniently be specified on project plans can easily be incorporated into Special Provisions within the TTC plan.

⁰² TTC plans range in scope from being very detailed to simply referencing typical drawings contained in this Manual, standard approved highway agency drawings and manuals, or specific drawings contained in the contract documents. The degree of detail in the TTC plan depends entirely on the nature and complexity of the situation.

Guidance:

⁰³ *TTC plans should be prepared by persons knowledgeable (for example, trained and/or certified) about the fundamental principles of TTC and work activities to be performed. The design, selection, and placement of TTC devices for a TTC plan should be based on engineering judgment.*

⁰⁴ *Coordination should be made between adjacent or overlapping projects to check that duplicate signing is not used and to check compatibility of traffic control between adjacent or overlapping projects.*

⁰⁵ *Traffic control planning should be completed for all highway construction, utility work, maintenance operations, and incident management including minor maintenance and utility projects prior to occupying the TTC zone. Planning for all road users should be included in the process.*

⁰⁶ *Provisions for effective continuity of accessible circulation paths for pedestrians should be incorporated into the TTC process. Where existing pedestrian routes are blocked or detoured, information should be provided about alternative routes that are usable by pedestrians with disabilities, particularly those who have visual disabilities. Access to temporary bus stops, travel across intersections with accessible pedestrian signals (see Section 4E.09), and other routing issues should be considered where temporary pedestrian routes are channelized. Barriers and channelizing devices that are detectable by people with visual disabilities should be provided.*

Option:

⁰⁷ Provisions may be incorporated into the project bid documents that enable contractors to develop an alternate TTC plan.

⁰⁸ Modifications of TTC plans may be necessary because of changed conditions or a determination of better methods of safely and efficiently handling road users.

Guidance:

Standard:

⁰⁹ **This alternate or modified plan shall have the approval of the Engineer or the Engineer's designee of the public agency or authority having jurisdiction over the highway responsible highway agency prior to implementation.**

Guidance:

¹⁰ *Provisions for effective continuity of transit service should be incorporated into the TTC planning process because often public transit buses cannot efficiently be detoured in the same manner as other vehicles (particularly for short-term maintenance projects). Where applicable, the TTC plan should provide for features such as accessible temporary bus stops, pull-outs, and satisfactory waiting areas for transit patrons, including persons with disabilities, if applicable (see Section 8A.08 for additional light rail transit issues to consider for TTC).*

¹¹ *Provisions for effective continuity of railroad service and acceptable access to abutting property owners and businesses should also be incorporated into the TTC planning process.*

Reduced Speed Limits in TTC Zones

Guidance:

¹² *Reduced speed limits should be used only in the specific portion of the TTC zone where conditions or restrictive features are present. However, frequent changes in the speed limit should be avoided. A TTC plan*

should be designed so that vehicles can travel through the TTC zone with a speed limit reduction of no more than 10 mph.

13 A reduction of more than 10 mph in the speed limit should be used only when required by restrictive features in the TTC zone. Where restrictive features justify a speed reduction of more than 10 mph, additional driver notification should be provided. The speed limit should be stepped down in advance of the location requiring the lowest speed, and additional TTC warning devices should be used.

14 Reduced speed zoning (lowering the regulatory speed limit) should be avoided as much as practical because drivers will reduce their speeds only if they clearly perceive a need to do so.

Standard:

14a The justification for the reduced regulatory speed limit shall be documented in writing. Refer to CVC 21367 and 22362.

Option:

14b Reduced speed limits in construction zones may be established by an engineering analysis, which may include a traffic and engineering survey.

Support:

15 Research has demonstrated that large reductions in the speed limit, such as a 30 mph reduction, increase speed variance and the potential for crashes. Smaller reductions in the speed limit of up to 10 mph cause smaller changes in speed variance and lessen the potential for increased crashes. A reduction in the regulatory speed limit of only up to 10 mph from the normal speed limit has been shown to be more effective.

Support:

16 See Section 2B.13 for Regulatory Speed Limit signs and Speed Zones.

17 See Section 6F.12 for WORK ZONE (G20-5aP) plaque and END WORK ZONE SPEED LIMIT (R2-12) sign.

18 CVC section 22362 gives the agency having jurisdiction over a highway the authority to regulate the speed of traffic to provide protection for workers when at work on the roadway or within the right-of-way so close thereto as to be endangered by passing traffic.

19 CVC Section 21367 gives the agency having jurisdiction over a highway the authority to regulate the speed of traffic whenever the traffic would endanger the safety of workers or the work would interfere with or endanger the movement of traffic through the area.

Guidance:

20 *The need for a long-term reduced speed limit within a TTC zone should be a decision made during the project development process. The need for a short-term reduced speed limit within a TTC zone, such as a maintenance activity, should be determined in advance of planned maintenance activities.*

Option:

21 If lowering speed limits for a short-term, such as a maintenance activity, signs lowering the speed limit by 10 mph or less may be placed in work zones that are not protected by a positive barrier and involve workers on foot or on equipment.

Guidance:

22 *Reducing speed limits in TTC zones should be avoided if traffic speeds can be reduced by other means. Speed restrictions should be imposed on the public only when necessary for worker or public safety.*

Standard:

23 **Where traffic obstructions exist only during the hours of construction, the speed zone signs shall be covered during non-working hours.**

Support:

24 CVC 22362 applies to "When Workers are Present" condition and signs need to be covered or removed when no work is in progress. As per CVC 21367, agency can "...regulate the movement of traffic...whenever the traffic would endanger the safety of workers or the work would interfere with or endanger the movement of traffic through the area." If obstructions would be present throughout the project duration the signs would not need to be covered or removed. This would also apply to situations where the construction work changes the highway configuration, curvature or elevation, making it necessary to post reduced speed limits.

Option:

25 The Advisory Speed (W13-1P) plaque may be used in combination with various warning type signs to decrease speed at a particular location. See Section 6F.52

Guidance:

26 To preserve the effectiveness of the W13-1P plaque, it should not be used unless the condition to which it applies is immediate and will be experienced by all motorists.

Guidance:

27 Construction zone speed limits should be reduced in sequential stages and where overall reduction of 15 mph or more is required. The first stage of the sequence should be a reduction of 10 mph and the final stage reduction should be 10 mph or 5 mph, as necessary.

Standard:

28 The reduced speed limit shall not be less than 25 mph. Refer to CVC 22362.

Option:

29 As an example, if the project falls within an established 55 mph zone, and a 40 mph speed limit is considered necessary, it may be posted only if the approaching speed limits are lowered in two stages (i.e., first to a 45 mph speed limit followed by a reduction to the desired 40 mph.)

Support:

30 Documentation for reducing speed limits in TTC zones are ordinarily issued for the entire length of the TTC zones in a project. This avoids the necessity and resulting delay of obtaining new documentation each time the speed restriction signs require relocation to fit the conditions. It is not the intention, however, that the entire length be posted for the duration of the project.

Standard:

31 Speed limit signs for reduced speed limits shall be posted only in areas where the traveling public is affected by TTC operations.

Standard:

32 Signs shall be used only during working hours and removed, or covered during non-working hours unless the movement of traffic through the TTC zone is affected during non-working hours as well. Refer to CVC 21367.

33 Signs shall be removed immediately following completion of the construction or change in the conditions for which they were installed. When the construction is completed or the speed restriction is no longer necessary, the formal speed zone orders shall be revoked.

Section 6C.02 Temporary Traffic Control Zones

Support:

01 A TTC zone is an area of a highway where road user conditions are changed because of a work zone, an incident zone, or a planned special event through the use of TTC devices, uniformed law enforcement officers, or other authorized personnel.

02 A work zone is an area of a highway with construction, maintenance, or utility work activities. A work zone is typically marked by signs, channelizing devices, barriers, pavement markings, and/or work vehicles. It extends from the first warning sign or high-intensity rotating, flashing, oscillating, or strobe lights on a vehicle to the END ROAD WORK sign or the last TTC device.

03 An incident zone is an area of a highway where temporary traffic controls are imposed by authorized officials in response to a traffic incident (see Section 6I.01). It extends from the first warning device (such as a sign, light, or cone) to the last TTC device or to a point where road users return to the original lane alignment and are clear of the incident.

04 A planned special event often creates the need to establish altered traffic patterns to handle the increased traffic volumes generated by the event. The size of the TTC zone associated with a planned special event can be small, such as closing a street for a festival, or can extend throughout a municipality for larger events. The duration of the TTC zone is determined by the duration of the planned special event.

Section 6C.03 Components of Temporary Traffic Control Zones

Support:

01 Most TTC zones are divided into four areas: the advance warning area, the transition area, the activity area, and the termination area. Figure 6C-1 illustrates these four areas. These four areas are described in Sections 6C.04 through 6C.07.

Section 6C.04 Advance Warning Area

Support:

01 The advance warning area is the section of highway where road users are informed about the upcoming work zone or incident area.

Option:

02 The advance warning area may vary from a single sign or high-intensity rotating, flashing, oscillating, or strobe lights on a vehicle to a series of signs in advance of the TTC zone activity area.

Guidance:

03 *Typical distances for placement of advance warning signs on freeways and expressways should be longer because drivers are conditioned to uninterrupted flow. Therefore, the advance warning sign placement should extend on these facilities as far as 1/2 mile or more.*

04 *On urban streets, the effective placement of the first warning sign in feet should range from 4 to 8 times the speed limit in mph, with the high end of the range being used when speeds are relatively high. When a single advance warning sign is used (in cases such as low-speed residential streets), the advance warning area can be as short as 100 feet. When two or more advance warning signs are used on higher-speed streets, such as major arterials, the advance warning area should extend a greater distance (see Table 6C-1).*

05 *Since rural highways are normally characterized by higher speeds, the effective placement of the first warning sign in feet should be substantially longer—from 8 to 12 times the speed limit in mph. Since two or more advance warning signs are normally used for these conditions, the advance warning area should extend 1,500 feet or more for open highway conditions (see Table 6C-1).*

06 *The distances contained in Table 6C-1 are approximate, are intended for guidance purposes only, and should be applied with engineering judgment. These distances should be adjusted for field conditions, if necessary, by increasing or decreasing the recommended distances.*

Support:

07 The need to provide additional reaction time for a condition is one example of justification for increasing the sign spacing. Conversely, decreasing the sign spacing might be justified in order to place a sign immediately downstream of an intersection or major driveway such that traffic turning onto the roadway in the direction of the TTC zone will be warned of the upcoming condition.

Option:

08 Advance warning may be eliminated when the activity area is sufficiently removed from the road users' path behind a barrier, more than 2 feet behind the curb, or 15 feet or more from the edge of the traveled way so that it does not interfere with the normal flow.

Section 6C.05 Transition Area

Support:

01 The transition area is that section of highway where road users are redirected out of their normal path. Transition areas usually involve strategic use of tapers, which because of their importance are discussed separately in detail.

Standard:

02 **When redirection of the road users' normal path is required, they shall be directed from the normal path to a new path.**

Option:

03 Because it is impractical in mobile operations to redirect the road user's normal path with stationary channelization, more dominant vehicle-mounted traffic control devices, such as arrow boards, portable changeable message signs, and high-intensity rotating, flashing, oscillating, or strobe lights, may be used instead of channelizing devices to establish a transition area.

Section 6C.06 Activity Area

Support:

01 The activity area is the section of the highway where the work activity takes place. It is comprised of the work space, the traffic space, and the buffer space.

02 The work space is that portion of the highway closed to road users and set aside for workers, equipment, and material, and a shadow vehicle if one is used upstream. Work spaces are usually delineated for road users by channelizing devices or, to exclude vehicles and pedestrians, by temporary barriers.

Option:

03 The work space may be stationary or may move as work progresses.

Guidance:

04 *Since there might be several work spaces (some even separated by several miles) within the project limits, each work space should be adequately signed to inform road users and reduce confusion.*

Support:

05 The traffic space is the portion of the highway in which road users are routed through the activity area.

06 The buffer space is a lateral and/or longitudinal area that separates road user flow from the work space or an unsafe area, and might provide some recovery space for an errant vehicle.

Guidance:

07 *Neither work activity nor storage of equipment, vehicles, or material should occur within a buffer space.*

Option:

08 Buffer spaces may be positioned either longitudinally or laterally with respect to the direction of road user flow. The activity area may contain one or more lateral or longitudinal buffer spaces.

09 A longitudinal buffer space may be placed in advance of a work space.

Guidance:

10 *The longitudinal buffer space ~~may~~ should also be used to separate opposing road user flows that use portions of the same traffic lane, as shown in Figure 6C-2.*

Option:

11 If a longitudinal buffer space is used, the values shown in Table 6C-2 and Table 6C-101(CA) may be used to determine the length of the longitudinal buffer space.

Support:

12 Typically, the buffer space is formed as a traffic island and defined by channelizing devices.

13 When a shadow vehicle, arrow board, or changeable message sign is placed in a closed lane in advance of a work space, only the area upstream of the vehicle, arrow board, or changeable message sign constitutes the buffer space.

Option:

14 The lateral buffer space may be used to separate the traffic space from the work space, as shown in Figures 6C-1 and 6C-2, or such areas as excavations or pavement edge drop-offs. A lateral buffer space also may be used between two travel lanes, especially those carrying opposing flows.

Guidance:

15 *The width of a lateral buffer space should be determined by engineering judgment.*

Option:

16 When work occurs on a high-volume, highly congested facility, a vehicle storage or staging space may be provided for incident response and emergency vehicles (for example, tow trucks and fire apparatus) so that these vehicles can respond quickly to road user incidents.

Section 6C.07 Termination Area

Support:

01 The termination area is the section of the highway where road users are returned to their normal driving path. The termination area extends from the downstream end of the work area to the last TTC device such as END ROAD WORK signs, if posted.

Option:

02 An END ROAD WORK sign, a Speed Limit sign, or other signs may be used to inform road users that they can resume normal operations.

03 A longitudinal buffer space may be used between the work space and the beginning of the downstream taper.

Section 6C.08 Tapers

Option:

01 Tapers may be used in both the transition and termination areas. Whenever tapers are to be used in close proximity to an interchange ramp, crossroads, curves, or other influencing factors, the length of the tapers may be adjusted.

Support:

02 Tapers are created by using a series of channelizing devices and/or pavement markings to move traffic out of or into the normal path. Types of tapers are shown in Figure 6C-2.

03 Longer tapers are not necessarily better than shorter tapers (particularly in urban areas with characteristics such as short block lengths or driveways) because extended tapers tend to encourage sluggish operation and to encourage drivers to delay lane changes unnecessarily. The test concerning adequate lengths of tapers involves observation of driver performance after TTC plans are put into effect.

Guidance:

04 *The appropriate taper length (L) should be determined using the criteria shown in Tables 6C-3, 6C-3(CA) and 6C-4.*

05 *The maximum distance in feet between devices in a taper should not exceed 1.0 times the speed limit in mph.*

Support:

06 A merging taper requires the longest distance because drivers are required to merge into common road space.

Guidance:

07 *A merging taper should be long enough to enable merging drivers to have adequate advance warning and sufficient length to adjust their speeds and merge into an adjacent lane before the downstream end of the transition.*

Support:

08 A shifting taper is used when a lateral shift is needed. When more space is available, a longer than minimum taper distance can be beneficial. Changes in alignment can also be accomplished by using horizontal curves designed for normal highway speeds.

Guidance:

09 *A shifting taper should have a length of approximately 1/2 L (see Tables 6C-3, 6C-3(CA) and 6C-4).*

Support:

10 A shoulder taper might be beneficial on a high-speed roadway where shoulders are part of the activity area and are closed, or when improved shoulders might be mistaken as a driving lane. In these instances, the same type, but abbreviated, closure procedures used on a normal portion of the roadway can be used.

Guidance:

11 *If used, shoulder tapers should have a length of approximately 1/3 L (see Tables 6C-3, 6C-3(CA) and 6C-4). If a shoulder is used as a travel lane, either through practice or during a TTC activity, a normal merging or shifting taper should be used.*

Support:

12 A downstream taper might be useful in termination areas to provide a visual cue to the driver that access is available back into the original lane or path that was closed.

Guidance:

13 *If used, a downstream taper should have a minimum length of 50 feet and a maximum length of 100 feet with devices placed at a spacing of approximately 20 feet.*

Support:

14 The one-lane, two-way taper is used in advance of an activity area that occupies part of a two-way roadway in such a way that a portion of the road is used alternately by traffic in each direction.

Guidance:

15 *Traffic should be controlled by a flagger or temporary traffic control signal (if sight distance is limited), or a STOP or YIELD sign. A short taper having a minimum length of 50 feet and a maximum length of 100 feet with channelizing devices at approximately 20-foot spacing should be used to guide traffic into the one-lane section, and a downstream taper should be used to guide traffic back into their original lane.*

Support:

16 An example of a one-lane, two-way traffic taper is shown in Figure 6C-3.

Guidance:

¹⁷ On State highways, Caltrans' Standard Plans for Traffic Control Systems (Standard Plans T9 through T17) should be used. See Section 1A.11 for information regarding this publication.

Section 6C.09 Detours and Diversions

Support:

⁰¹ A detour is a temporary rerouting of road users onto an existing highway in order to avoid a TTC zone.

Guidance:

⁰² Detours should be clearly signed over their entire length so that road users can easily use existing highways to return to the original highway.

Support:

⁰³ A diversion is a temporary rerouting of road users onto a temporary highway or alignment placed around the work area.

Standard:

⁰⁴ **The detour route shall be evaluated for height, weight, and size restrictions. Appropriate signs shall be posted along the route to advise road users of any restrictions. Refer to CVC 21363 for detour signs.**

Option:

⁰⁵ Advance signs or changeable message signs (CMS) may be necessary to give trucks an opportunity to turn around and retrace their path or select another route.

Section 6C.10 One-Lane, Two-Way Traffic Control

Standard:

⁰¹ **Except as provided in Paragraph 5, when traffic in both directions must use a single lane for a limited distance, movements from each end shall be coordinated.**

Guidance:

⁰² *Provisions should be made for alternate one-way movement through the constricted section via methods such as flagger control, ~~a flag transfer~~, a pilot car, traffic control signals, or stop or yield control.*

⁰³ *Control points at each end should be chosen to permit easy passing of opposing lanes of vehicles.*

⁰⁴ *If traffic on the affected one-lane roadway is not visible from one end to the other, then flagging procedures, a pilot car with a flagger used as described in Section 6C.13, or a traffic control signal should be used to control opposing traffic flows.*

Option:

⁰⁵ If the work space on a low-volume street or road is short and road users from both directions are able to see the traffic approaching from the opposite direction through and beyond the worksite, the movement of traffic through a one-lane, two-way constriction may be self-regulating.

Support:

⁰⁶ See Section 5A.01 and Section 6A.01 for definition of a low-volume road where paragraph 5 is applied.

Section 6C.11 Flagger Method of One-Lane, Two-Way Traffic Control

Guidance:

⁰¹ *Except as provided in Paragraph 2, traffic should be controlled by a flagger at each end of a constricted section of roadway. One of the flaggers should be designated as the coordinator. To provide coordination of the control of the traffic, the flaggers should be able to communicate with each other orally, electronically, or with manual signals. These manual signals should not be mistaken for flagging signals.*

Option:

⁰² When a one-lane, two-way TTC zone is short enough to allow a flagger to see from one end of the zone to the other, traffic may be controlled by either a single flagger or by a flagger at each end of the section.

Guidance:

⁰³ *When a single flagger is used, the flagger should be stationed on the shoulder opposite the constriction or work space, or in a position where good visibility and traffic control can be maintained at all times. When good visibility and traffic control cannot be maintained by one flagger station, traffic should be controlled by a flagger at each end of the section.*



Section 6C.12 Flag Transfer Method of One-Lane, Two-Way Traffic Control

Support:

01 The driver of the last vehicle proceeding into the one-lane section is given a red flag (or other token) and instructed to deliver it to the flagger at the other end. The opposite flagger, upon receipt of the flag, then knows that traffic can be permitted to move in the other direction. A variation of this method is to replace the use of a flag with an official pilot car that follows the last road user vehicle proceeding through the section.

Guidance:

02 *The flag transfer method should be employed only where the one-way traffic is confined to a relatively short length of a road, usually no more than 1 mile in length.*

Standard:

01 This section is deleted for application and shall not be used in California. See section 6C.10, 6C.11, 6C.13, 6C.14, and 6C.15 for other methods of one-lane, two-way traffic control that are to be used in California.

Section 6C.13 Pilot Car Method of One-Lane, Two-Way Traffic Control

Option:

01 A pilot car may be used to guide a queue of vehicles through the TTC zone or detour.

Guidance:

02 *The pilot car should have the name of the contractor or contracting authority prominently displayed.*

Standard:

03 **The PILOT CAR FOLLOW ME (G20-4) sign or PILOT CAR DO NOT PASS (R115(CA)) sign (see Section 6F.58) shall be mounted on the rear of the pilot vehicle.**

04 **A flagger shall be stationed on the approach to the activity area to control vehicular traffic until the pilot vehicle is available.**

Option:

05 Two or more pilot cars may be used to guide two-way traffic through a particularly complex detour or TTC zone.

Section 6C.14 Temporary Traffic Control Signal Method of One-Lane, Two-Way Traffic Control

Option:

01 Traffic control signals may be used to control vehicular traffic movements in one-lane, two-way TTC zones (see Figure 6H-12 and Chapter 4H).

Section 6C.15 Stop or Yield Control Method of One-Lane, Two-Way Traffic Control

Option:

01 STOP or YIELD signs may be used to control traffic on low-volume roads at a one-lane, two-way TTC zone when drivers are able to see the other end of the one-lane, two-way operation and have sufficient visibility of approaching vehicles.

Guidance:

02 *If the STOP or YIELD sign is installed for only one direction, then the STOP or YIELD sign should face road users who are driving on the side of the roadway that is closed for the work activity area.*

Standard:

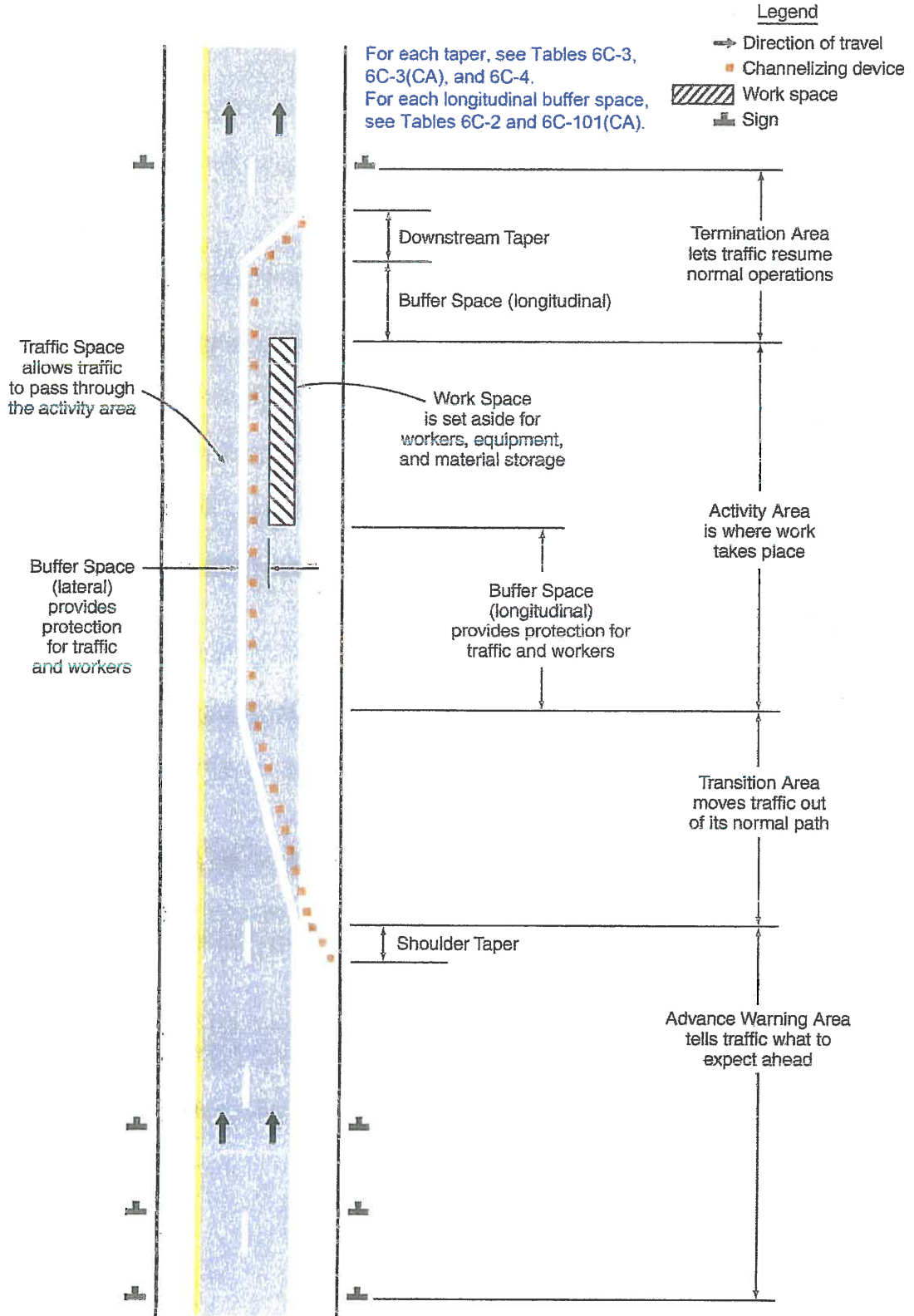
03 **The approach to the side that is not closed shall be visible (for a distance equal to the safe passing sight distance for that approach) to the driver who must yield or stop.**

Support:

04 See Section 3B.02 and Figure 6H-11.

Figure 6C-1. Component Parts of a Temporary Traffic Control Zone

Merging TAPER



Shifting Taper.

Figure 6C-2. Types of Tapers and Buffer Spaces

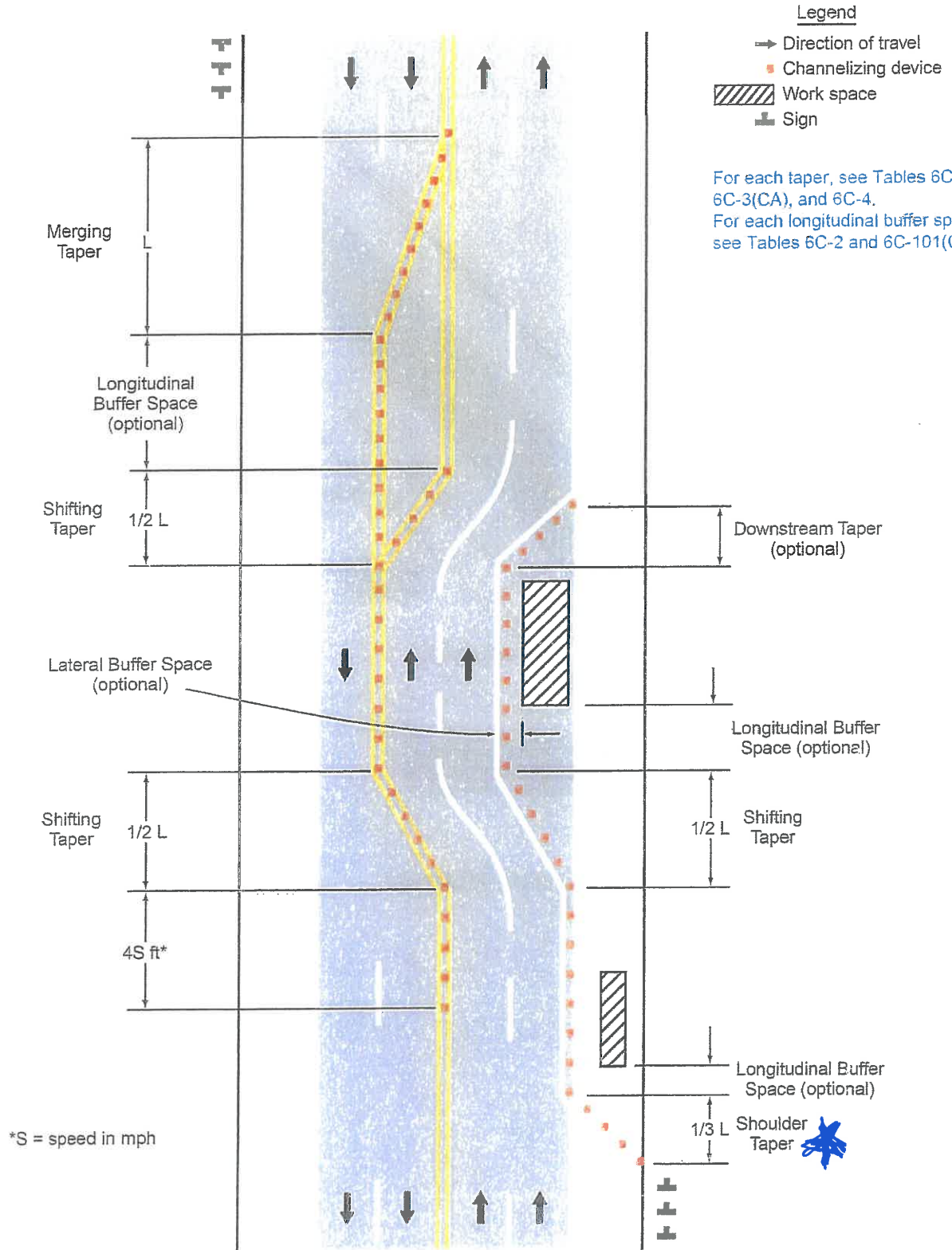




Figure 6C-3. Example of a One-Lane, Two-Way Traffic Taper

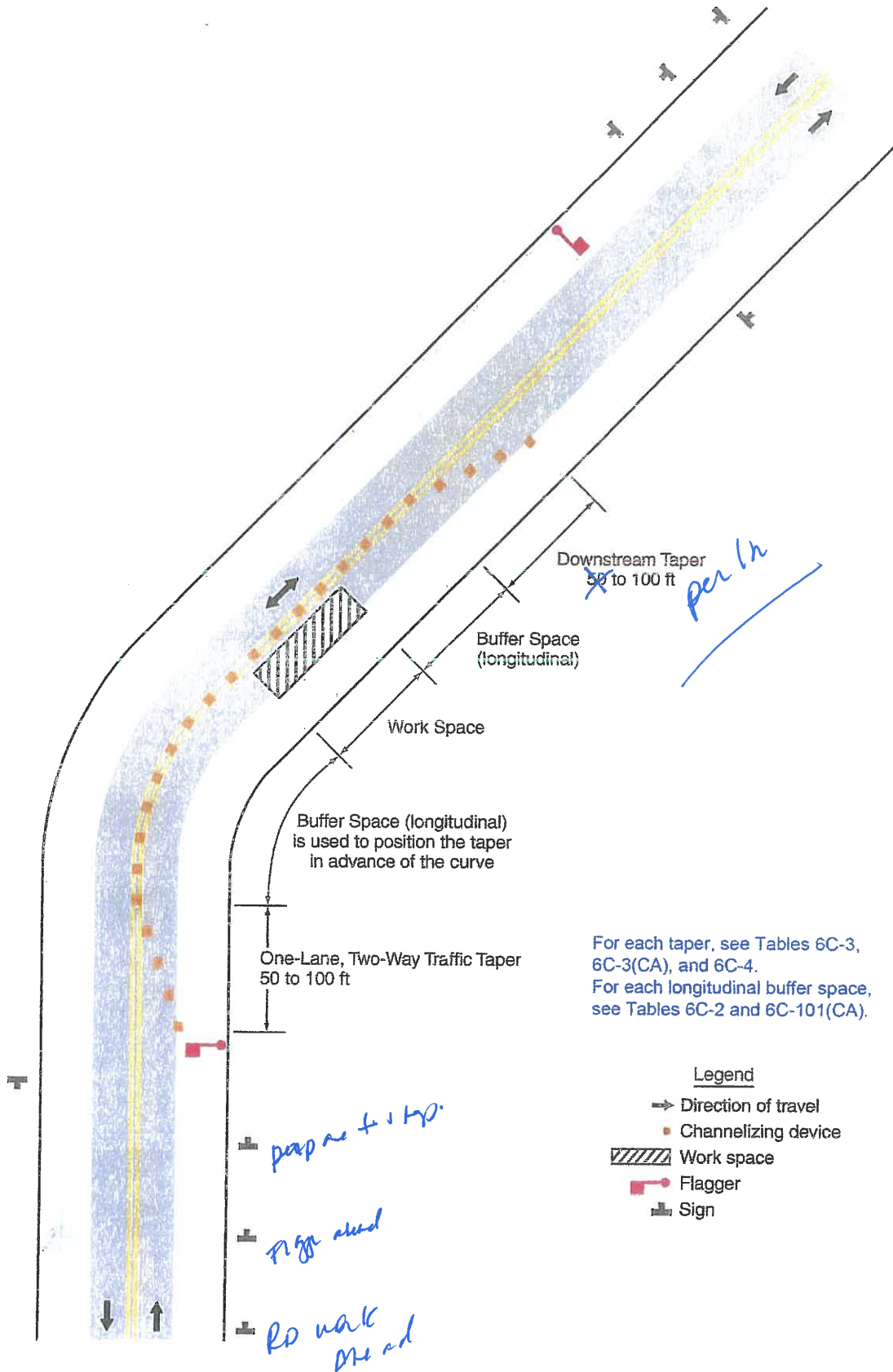


Table 6C-1. Recommended Advance Warning Sign ~~Minimum~~ Spacing

Road Type	Distance Between Signs**		
	A	B	C
Urban (low speed) - 25 mph or less 10-20 MPH	100 feet	100 feet	100 feet
Urban - more than 25 mph to 40 mph***	250 feet	250 feet	250 feet
Urban (high speed) - 40 to 45 mph 30 to 40 mph	350 feet	350 feet	350 feet
Rural 40-55 MPH	500 feet	500 feet	500 feet
Expressway / Freeway	1,000 feet	1,500 feet	2,640 feet

- * ~~Speed category to be determined by the highway agency.~~
- ** The column headings A, B, and C are the dimensions shown in Figures 6H-1 through 6H-46. The A dimension is the distance from the transition or point of restriction to the first sign. The B dimension is the distance between the first and second signs. The C dimension is the distance between the second and third signs. (The "first sign" is the sign in a three-sign series that is closest to the TTC zone. The "third sign" is the sign that is furthest upstream from the TTC zone.)
- *** Posted speed limit, off-peak 85th-percentile speed prior to work starting, or other anticipated operating speed in mph.

NO FLAGGING OVER 38 MPH.

Table 6C-2. Stopping Sight Distance as a Function of Speed on Level Roads.
 (Used as suggested longitudinal buffer space length or location for flagger station)

Speed*	Distance
20 mph	115 feet
25 mph	155 feet
30 mph	200 feet
35 mph	250 feet
40 mph	305 feet
45 mph	360 feet
50 mph	425 feet
55 mph	495 feet
60 mph	570 feet
65 mph	645 feet
70 mph	730 feet
75 mph	820 feet

* Posted speed, off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed in mph.

Table 6C-3. Taper Length Criteria for Temporary Traffic Control Zones

Type of Taper	Taper Length
Merging Taper	at least L
Shifting Taper	at least 0.5 L
Shoulder Taper	at least 0.33 L
One-Lane, Two-Way Traffic Taper	50 feet minimum, 100 feet maximum
Downstream Taper	50 feet minimum, 100 feet maximum

Note: Use Table 6C-4 to calculate L

**Table 6C-3(CA). Taper Length Criteria for Temporary Traffic Control Zones
 (for 12 feet Offset Width)**

Speed* S (mph)	Minimum Taper Length** for Width of Offset 12 feet (W)			
	Merging L (feet)	Shifting L/2 (feet)	Shoulder L/3 (feet)	Down Stream (feet)***
20	80	40	27	50
25	125	63	42	50
30	180	90	60	50
35	245	123	82	50
40	320	160	107	50
45	540	270	180	50
50	600	300	200	50
55	660	330	220	50
60	720	360	240	50
65	780	390	260	50
70	840	420	280	50
75	900	450	300	50

* - Posted speed limit, off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed in mph.

** - For other offsets use the following merging taper length formula for L:
 For speeds of 40 mph or less, $L = WS^2/60$
 For speeds of 45 mph or more, $L = WS$

Where: L = taper length in feet
 W = width of offset in feet
 S = posted speed limit, off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed in mph

*** - Maximum downstream taper length is 100 feet. See Section 6C.08.

**Table 6C-4. Formulas for Determining
 Taper Length**

Speed (S)	Taper Length (L) in feet
40 mph or less	$L = \frac{WS^2}{60}$
45 mph or more	$L = WS$

Where: L = taper length in feet
 W = width of offset in feet
 S = posted speed limit, or off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed in mph

**Table 6C-101(CA). Stopping Sight Distance as a Function of Speed on Downgrades.
 (Used as suggested longitudinal buffer space length or location for flagger station)**

Speed (mph)	% Downgrade (Buffer Space)		
	-3% (feet)	-6% (feet)	-9% (feet)
20	116	120	126
25	158	165	173
30	205	215	227
35	257	271	287
40	315	333	354
45	378	400	427
50	446	474	507
55	520	553	593
60	598	638	686
65	682	728	785
70	771	825	891
75	866	927	1003

* Exhibit 3-2. A Policy on Geometric Design of Highways and Streets, AASHTO, 2001, p.115.

CHAPTER 6D. PEDESTRIAN AND WORKER SAFETY

Section 6D.01 Pedestrian Considerations

Support:

01 A wide range of pedestrians might be affected by TTC zones, including the young, elderly, and people with disabilities such as hearing, visual, or mobility. These pedestrians need a clearly delineated and usable travel path. Considerations for pedestrians with disabilities are addressed in Section 6D.02.

Standard:

02 **The various TTC provisions for pedestrian and worker safety set forth in Part 6 shall be applied by knowledgeable (for example, trained and/or certified) persons after appropriate evaluation and engineering judgment.**

03 **Advance notification of sidewalk closures shall be provided by the maintaining agency.**

04 **If the TTC zone affects the movement of pedestrians, adequate pedestrian access and walkways shall be provided. If the TTC zone affects an accessible and detectable pedestrian facility, the accessibility and detectability shall be maintained along the alternate pedestrian route.**

Option:

05 If establishing or maintaining an alternate pedestrian route is not feasible during the project, an alternate means of providing for pedestrians may be used, such as adding free bus service around the project or assigning someone the responsibility to assist pedestrians with disabilities through the project limits.

Support:

06 It must be recognized that pedestrians are reluctant to retrace their steps to a prior intersection for a crossing or to add distance or out-of-the-way travel to a destination.

Guidance:

07 *The following three items should be considered when planning for pedestrians in TTC zones:*

A. *Pedestrians should not be led into conflicts with vehicles, equipment, and operations.*

B. *Pedestrians should not be led into conflicts with vehicles moving through or around the worksite.*

C. *Pedestrians should be provided with a convenient and accessible path that replicates as nearly as practical the most desirable characteristics of the existing sidewalk(s) or footpath(s).*

08 *A pedestrian route should not be severed and/or moved for non-construction activities such as parking for vehicles and equipment.*

09 *Consideration should be made to separate pedestrian movements from both worksite activity and vehicular traffic. Unless an acceptable route that does not involve crossing the roadway can be provided, pedestrians should be appropriately directed with advance signing that encourages them to cross to the opposite side of the roadway. In urban and suburban areas with high vehicular traffic volumes, these signs should be placed at intersections (rather than midblock locations) so that pedestrians are not confronted with midblock worksites that will induce them to attempt skirting the worksite or making a midblock crossing.*

Support:

10 Figures 6H-28 and 6H-29 show typical TTC device usage and techniques for pedestrian movement through work zones.

Guidance:

11 *To accommodate the needs of pedestrians, including those with disabilities, the following considerations should be addressed when temporary pedestrian pathways in TTC zones are designed or modified:*

A. *Provisions for continuity of accessible paths for pedestrians should be incorporated into the TTC plan.*

B. *Access to transit stops should be maintained.*

C. *A smooth, continuous hard surface should be provided throughout the entire length of the temporary pedestrian facility. There should be no curbs or abrupt changes in grade or terrain that could cause tripping or be a barrier to wheelchair use. The geometry and alignment of the facility should meet the applicable requirements of the "Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)" (see Section 1A.11).*

D. *The width of the existing pedestrian facility should be provided for the temporary facility if practical. Traffic control devices and other construction materials and features should not intrude into the usable width of the*

sidewalk, temporary pathway, or other pedestrian facility. When it is not possible to maintain a minimum width of 60 inches throughout the entire length of the pedestrian pathway, a 60 x 60-inch passing space should be provided at least every 200 feet to allow individuals in wheelchairs to pass.

- E. Blocked routes, alternate crossings, and sign and signal information should be communicated to pedestrians with visual disabilities by providing devices such as audible information devices, accessible pedestrian signals, or barriers and channelizing devices that are detectable to the pedestrians traveling with the aid of a long cane or who have low vision. Where pedestrian traffic is detoured to a TTC signal, engineering judgment should be used to determine if pedestrian signals or accessible pedestrian signals should be considered for crossings along an alternate route.*
- F. When channelization is used to delineate a pedestrian pathway, a continuous detectable edging should be provided throughout the length of the facility such that pedestrians using a long cane can follow it. These detectable edgings should comply with the provisions of Section 6F.74.*
- G. Signs and other devices mounted lower than 7 feet above the temporary pedestrian pathway should not project more than 4 inches into accessible pedestrian facilities.*

Option:

12 Whenever it is feasible, closing off the worksite from pedestrian intrusion may be preferable to channelizing pedestrian traffic along the site with TTC devices.

Guidance:

13 Fencing should not create sight distance restrictions for road users. Fences should not be constructed of materials that would be hazardous if impacted by vehicles. Wooden railing, fencing, and similar systems placed immediately adjacent to motor vehicle traffic should not be used as substitutes for crashworthy temporary traffic barriers.

14 Ballast for TTC devices should be kept to the minimum amount needed and should be mounted low to prevent penetration of the vehicle windshield.

15 Movement by work vehicles and equipment across designated pedestrian paths should be minimized and, when necessary, should be controlled by flaggers or TTC. Staging or stopping of work vehicles or equipment along the side of pedestrian paths should be avoided, since it encourages movement of workers, equipment, and materials across the pedestrian path.

16 Access to the work space by workers and equipment across pedestrian walkways should be minimized because the access often creates unacceptable changes in grade, and rough or muddy terrain, and pedestrians will tend to avoid these areas by attempting non-intersection crossings where no curb ramps are available.

Option:

17 A canopied walkway may be used to protect pedestrians from falling debris, and to provide a covered passage for pedestrians.

Guidance:

18 Covered walkways should be sturdily constructed and adequately lighted for nighttime use.

19 When pedestrian and vehicle paths are rerouted to a closer proximity to each other, consideration should be given to separating them by a temporary traffic barrier.

20 If a temporary traffic barrier is used to shield pedestrians, it should be designed to accommodate site conditions.

Support:

21 Depending on the possible vehicular speed and angle of impact, temporary traffic barriers might deflect upon impact by an errant vehicle. Guidance for locating and designing temporary traffic barriers can be found in Chapter 9 of AASHTO's "Roadside Design Guide" (see Section 1A.11).

Standard:

22 Short intermittent segments of temporary traffic barrier shall not be used because they nullify the containment and redirective capabilities of the temporary traffic barrier, increase the potential for serious injury both to vehicle occupants and pedestrians, and encourage the presence of blunt, leading ends. All upstream leading ends that are present shall be appropriately flared or protected with properly installed and maintained crashworthy cushions. Adjacent temporary traffic barrier segments shall be properly connected in order to provide the overall strength required for the temporary traffic barrier to perform properly.

23 Normal vertical curbing shall not be used as a substitute for temporary traffic barriers when temporary traffic barriers are needed.

Option:

24 Temporary traffic barriers or longitudinal channelizing devices may be used to discourage pedestrians from unauthorized movements into the work space. They may also be used to inhibit conflicts with vehicular traffic by minimizing the possibility of midblock crossings.

Support:

25 A major concern for pedestrians is urban and suburban building construction encroaching onto the contiguous sidewalks, which forces pedestrians off the curb into direct conflict with moving vehicles.

Guidance:

26 *If a significant potential exists for vehicle incursions into the pedestrian path, pedestrians should be rerouted or temporary traffic barriers should be installed.*

Support:

27 TTC devices, jersey barriers, and wood or chain link fencing with a continuous detectable edging can satisfactorily delineate a pedestrian path.

Guidance:

28 *Tape, rope, or plastic chain strung between devices are not detectable, do not comply with the design standards in the "Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)" (see Section 1A.11), and should not be used as a control for pedestrian movements.*

29 *In general, pedestrian routes should be preserved in urban and commercial suburban areas. Alternative routing should be discouraged.*

30 *The highway agency in charge of the TTC zone should regularly inspect the activity area so that effective pedestrian TTC is maintained.*

Support:

31 Other laws and requirements are unique to California and need to be followed when providing pedestrian access through or around TTC zones.

32 Additional information on this topic can be found in publication titled "Pedestrian Considerations for California Temporary Traffic Control Zones on Caltrans' following web link:

<http://dot.ca.gov/hq/traffops/engineering/control-devices/pdf/PedBrochure.pdf>

Section 6D.02 Accessibility Considerations

Support:

01 Additional information on the design and construction of accessible temporary facilities is found in publications listed in Section 1A.11 (see Publications 12, 38, 39, and 42).

Guidance:

02 *The extent of pedestrian needs should be determined through engineering judgment or by the individual responsible for each TTC zone situation. Adequate provisions should be made for pedestrians with disabilities.*

Standard:

03 **When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and include accessibility features consistent with the features present in the existing pedestrian facility. Where pedestrians with visual disabilities normally use the closed sidewalk, a barrier that is detectable by a person with a visual disability traveling with the aid of a long cane shall be placed across the full width of the closed sidewalk.**

Support:

04 Maintaining a detectable, channelized pedestrian route is much more useful to pedestrians who have visual disabilities than closing a walkway and providing audible directions to an alternate route involving additional crossings and a return to the original route. Braille is not useful in conveying such information because it is difficult to find. Audible instructions might be provided, but the extra distance and additional street crossings might add complexity to a trip.

Guidance:

05 *Because printed signs and surface delineation are not usable by pedestrians with visual disabilities, blocked routes, alternate crossings, and sign and signal information should be communicated to pedestrians with visual*

disabilities by providing audible information devices, accessible pedestrian signals, and barriers and channelizing devices that are detectable to pedestrians traveling with the aid of a long cane or who have low vision.

Support:

06 The most desirable way to provide information to pedestrians with visual disabilities that is equivalent to visual signing for notification of sidewalk closures is a speech message provided by an audible information device. Devices that provide speech messages in response to passive pedestrian actuation are the most desirable. Other devices that continuously emit a message, or that emit a message in response to use of a pushbutton, are also acceptable. Signing information can also be transmitted to personal receivers, but currently such receivers are not likely to be carried or used by pedestrians with visual disabilities in TTC zones. Audible information devices might not be needed if detectable channelizing devices make an alternate route of travel evident to pedestrians with visual disabilities.

Guidance:

07 *If a pushbutton is used to provide equivalent TTC information to pedestrians with visual disabilities, the pushbutton should be equipped with a locator tone to notify pedestrians with visual disabilities that a special accommodation is available, and to help them locate the pushbutton.*

Section 6D.03 Worker Safety Considerations

Support:

01 Equally as important as the safety of road users traveling through the TTC zone is the safety of workers. TTC zones present temporary and constantly changing conditions that are unexpected by the road user. This creates an even higher degree of vulnerability for workers on or near the roadway.

02 Maintaining TTC zones with road user flow inhibited as little as possible, and using TTC devices that get the road user's attention and provide positive direction are of particular importance. Likewise, equipment and vehicles moving within the activity area create a risk to workers on foot. When possible, the separation of moving equipment and construction vehicles from workers on foot provides the operator of these vehicles with a greater separation clearance and improved sight lines to minimize exposure to the hazards of moving vehicles and equipment.

Guidance:

03 *The following are the key elements of worker safety and TTC management that should be considered to improve worker safety:*

- A. *Training—all workers should be trained on how to work next to motor vehicle traffic in a way that minimizes their vulnerability. Workers having specific TTC responsibilities should be trained in TTC techniques, device usage, and placement.*
- B. *Temporary Traffic Barriers—temporary traffic barriers should be placed along the work space depending on factors such as lateral clearance of workers from adjacent traffic, speed of traffic, duration and type of operations, time of day, and volume of traffic.*
- C. *Speed Reduction—reducing the speed of vehicular traffic, mainly through regulatory speed zoning, funneling, lane reduction, or the use of uniformed law enforcement officers or flaggers, should be considered. The use of regulatory speed zone signing tends to be more effective when law enforcement is present. Refer to Section 6C.01.*
- D. *Activity Area—planning the internal work activity area to minimize backing-up maneuvers of construction vehicles should be considered to minimize the exposure to risk.*
- E. *Worker Safety Planning—a trained person designated by the employer should conduct a basic hazard assessment for the worksite and job classifications required in the activity area. This safety professional should determine whether engineering, administrative, or personal protection measures should be implemented. This plan should be in accordance with the Occupational Safety and Health Act of 1970, as amended, "General Duty Clause" Section 5(a)(1) - Public Law 91-596, 84 Stat. 1590, December 29, 1970, as amended, and with the requirement to assess worker risk exposures for each job site and job classification, as per 29 CFR 1926.20 (b)(2) of "Occupational Safety and Health Administration Regulations, General Safety and Health Provisions" (see Section 1A.11).*

Standard:

04 All workers, including emergency responders, within the right-of-way who are exposed either to traffic (vehicles using the highway for purposes of travel) or to work vehicles and construction equipment within the TTC zone shall wear high-visibility safety apparel that meets the Performance Class 2 or 3 requirements of the ANSI/ISEA 107-2004 publication entitled "American National Standard for High-Visibility Safety Apparel and Headwear" (see Section 1A.11), or equivalent revisions, and labeled as meeting the ANSI 107-2004, or equivalent revisions, standard performance for Class 2 or 3 risk exposure, except as provided in Paragraph 5. A person designated by the employer to be responsible for worker safety shall make the selection of the appropriate class of garment.

04a Refer to Construction Safety Order in the California Code of Regulations (Title 8, Division 1, Chapter 4, Subchapter 4, Article 11, Section 1598 and 1599). See Section 1A.11 for information regarding this publication.

Option:

05 Emergency and incident responders and law enforcement personnel within the TTC zone may wear high-visibility safety apparel that meets the performance requirements of the ANSI/ISEA 207-2006 publication entitled "American National Standard for High-Visibility Public Safety Vests" (see Section 1A.11), or equivalent revisions, and labeled as ANSI 207-2006, or equivalent revisions, in lieu of ANSI/ISEA 107-2004 apparel.

Standard:

06 When uniformed law enforcement personnel are used to direct traffic, to investigate crashes, or to handle lane closures, obstructed roadways, and disasters, high-visibility safety apparel as described in this Section shall be worn by the law enforcement personnel.

07 Except as provided in Paragraph 8, firefighters or other emergency responders working within the right-of-way shall wear high-visibility safety apparel as described in this Section.

Option:

08 Firefighters or other emergency responders working within the right-of-way and engaged in emergency operations that directly expose them to flame, fire, heat, and/or hazardous materials may wear retroreflective turnout gear that is specified and regulated by other organizations, such as the National Fire Protection Association.

09 The following are additional elements of TTC management that may be considered to improve worker safety:

- A. Shadow Vehicle**—in the case of mobile and constantly moving operations, such as pothole patching and striping operations, a shadow vehicle, equipped with appropriate lights and warning signs, may be used to protect the workers from impacts by errant vehicles. The shadow vehicle may be equipped with a rear-mounted impact attenuator.
- B. Road Closure**—if alternate routes are available to handle road users, the road may be closed temporarily. This may also facilitate project completion and thus further reduce worker vulnerability.
- C. Law Enforcement Use**—in highly vulnerable work situations, particularly those of relatively short duration, law enforcement units may be stationed to heighten the awareness of passing vehicular traffic and to improve safety through the TTC zone.
- D. Lighting**—for nighttime work, the TTC zone and approaches may be lighted.

Guidance:

Care should be taken to ensure that the lighting used for nighttime work does not cause blinding. Refer to CVC 21466.5 for light impairing driver's vision.

Support:

For construction lighting Refer to Construction Safety Order in the California Code of Regulations (Title 8, Division 1, Chapter 4, Subchapter 4, Article 3, Section 1523 - Illumination). See Section 1A.11 for information regarding this publication.

Option:

- E. Special Devices**—these include rumble strips, changeable message signs, hazard identification beacons, flags, and warning lights. Intrusion warning devices may be used to alert workers to the approach of errant vehicles.

Support:

- F. Public Information** – Well informed public plays an important role in worker safety. See Section 6B.01 for details.

Support:

¹⁰ Judicious use of the special devices described in Item E in Paragraph 9 might be helpful for certain difficult TTC situations, but misuse or overuse of special devices or techniques might lessen their effectiveness.

Section 6D.101(CA) Bicycle Considerations

Support:

⁰¹ There are several considerations in planning for bicyclists in TTC zones on highways and streets:

- A. A travel route that replicates the most desirable characteristics of a wide paved shoulder or bikeway through or around the TTC zone is desirable for bicyclists.
- B. If the TTC zone interrupts the continuity of an existing bikeway system, signs directing bicyclists through or around the zone and back to the bikeway is desirable.
- C. Unless a separate bike path through or around the TTC zone is provided, adequate roadway lane width to allow bicyclists and motor vehicles to travel side by side through or around the TTC zone is desirable.

Guidance:

D. *When the roadway width is inadequate for allowing bicyclists and motor vehicles to travel side by side, warning signs should be used to advise motorists of the presence of bicyclists in the travel way lanes. See Section 6G.05 for more details.*

Standard:

E. **Bicyclists shall not be led into direct conflicts with mainline traffic, work site vehicles, or equipment moving through or around the TTC zone.**

Support:

⁰² Figures 6H-15, 6H-30, 6H-32(CA), 6H-36(CA), 6H-101(CA), 6H-102(CA), 6H-103(CA), and 6H-104(CA) show typical TTC device usage and techniques for bicycle movement through TTC zones.

CHAPTER 6E. FLAGGER CONTROL

Section 6E.01 Qualifications for Flaggers

Guidance:

01 Because flaggers are responsible for public safety and make the greatest number of contacts with the public of all highway workers, they should be trained in safe traffic control practices and public contact techniques.

Flaggers should be able to satisfactorily demonstrate the following abilities:

- A. Ability to receive and communicate specific instructions clearly, firmly, and courteously;*
- B. Ability to move and maneuver quickly in order to avoid danger from errant vehicles;*
- C. Ability to control signaling devices (such as paddles and flags) in order to provide clear and positive guidance to drivers approaching a TTC zone in frequently changing situations;*
- D. Ability to understand and apply safe traffic control practices, sometimes in stressful or emergency situations; and*
- E. Ability to recognize dangerous traffic situations and warn workers in sufficient time to avoid injury.*

Standard:

02 Flaggers shall be trained in the proper fundamentals of flagging moving traffic before being assigned as flaggers. Signaling directions used by flaggers shall conform to Figure 6E-3. The training and instructions shall be based on this Manual and work site conditions and also include the following:

- (1) flagger equipment which must be used,**
- (2) layout of the work zone and flagging station,**
- (3) methods to signal traffic to stop, proceed or slow down,**
- (4) methods of one-way traffic control,**
- (5) trainee demonstration of proper flagging methodology and operations,**
- (6) emergency vehicles traveling through the work zone,**
- (7) handling emergency situations,**
- (8) methods of dealing with hostile drivers,**
- (9) flagging procedures when a single flagger is used (when applicable),**

03 Documentation of the training shall be maintained as required by Injury Illness and Prevention Program of the General Industry Safety Order in the California Code of Regulations (Title 8, Division 1, Chapter 4, Subchapter 7, Section 3203).

04 Flaggers shall be trained by persons with the qualifications and experience necessary to effectively instruct the employee in the proper fundamentals of flagging moving traffic.

Support:

05 Refer to Construction Safety Order in the California Code of Regulations (Title 8, Division 1, Chapter 4, Subchapter 4, Article 11, Section 1599 - Flaggers) for flagger training. See Section 1A.11 for information regarding this publication.

Section 6E.02 High-Visibility Safety Apparel

Standard:

01 For daytime and nighttime activity, flaggers shall wear high-visibility safety apparel that meets the Performance Class 2 or 3 requirements of the ANSI/ISEA 107-2004 publication entitled "American National Standard for High-Visibility Apparel and Headwear" (see Section 1A.11), or equivalent revisions, and labeled as meeting the ANSI 107-2004, or equivalent revisions, standard performance for Class 2 or 3 risk exposure. The apparel background (outer) material color shall be fluorescent orange-red, fluorescent yellow-green, or a combination of the two as defined in the ANSI standard. The retroreflective material shall be orange, yellow, white, silver, yellow-green, or a fluorescent version of these colors, and shall be visible at a minimum distance of 1,000 feet. The retroreflective safety apparel shall be designed to clearly identify the wearer as a person.

Guidance:

02 For nighttime activity, high-visibility safety apparel that meets the Performance Class 3 requirements of the ANSI/ISEA 107-2004 publication entitled "American National Standard for High-Visibility Apparel and

Headwear” (see Section 1A.11), or equivalent revisions, and labeled as meeting the ANSI 107-2004, or equivalent revisions, standard performance for Class 3 risk exposure should be considered for flagger wear.

Standard:

03 When uniformed law enforcement officers are used to direct traffic within a TTC zone, they shall wear high-visibility safety apparel as described in this Section.

Option:

04 In lieu of ANSI/ISEA 107-2004, or equivalent revisions apparel, law enforcement personnel within the TTC zone may wear high-visibility safety apparel that meets the performance requirements of the ANSI/ISEA 207-2006 publication entitled “American National Standard for High-Visibility Public Safety Vests” (see Section 1A.11), or equivalent revisions, and labeled as ANSI 207-2006, or equivalent revisions.

Section 6E.03 Hand-Signaling Devices

Guidance:

Standard:

01 The STOP/SLOW (R1-1/W20-8) paddle ~~should~~ shall be the primary and preferred hand-signaling device because the STOP/SLOW paddle gives road users more positive guidance than red flags. Use of flags ~~should~~ shall be limited to emergency situations.

Standard:

02 The STOP/SLOW paddle shall have an octagonal shape on a rigid handle. STOP/SLOW paddles shall be at least 18 inches wide with letters at least 6 inches high. The STOP (R1-1) face shall have white letters and a white border on a red or fluorescent red background. The SLOW (W20-8) face shall have black letters and a black border on an orange or fluorescent orange background. When used at night, the STOP/SLOW paddle shall be retroreflectorized.

02a The sign retroreflectivity shall be maintained at or above the minimum levels in Table 2A-3.

Guidance:

03 The STOP/SLOW paddle should be fabricated from light semi-rigid material. The bottom of the STOP/SLOW sign portion of the paddle should be a minimum of 6 feet above the pavement when mounted on a rigid staff.

Support:

04 The optimum method of displaying a STOP or SLOW message is to place the STOP/SLOW paddle on a rigid staff that is tall enough that when the end of the staff is resting on the ground, the message is high enough to be seen by approaching or stopped traffic.

Option:

04a The 24 x 24 inch size of the STOP/SLOW paddle may be used where greater emphasis is needed and speeds are 30 mph or more.

05 The STOP/SLOW paddle may be modified to improve conspicuity by incorporating ~~either white or red~~ flashing lights on the STOP face, and ~~either white or yellow~~ flashing lights on the SLOW face. The flashing lights may be arranged in any of the following patterns:

- A. Two ~~white or red~~ lights, one centered vertically above and one centered vertically below the STOP legend; and/or two ~~white or yellow~~ lights, one centered vertically above and one centered vertically below the SLOW legend;
- B. Two ~~white or red~~ lights, one centered horizontally on each side of the STOP legend; and/or two ~~white or yellow~~ lights, one centered horizontally on each side of the SLOW legend;
- C. One ~~white or red~~ light centered below the STOP legend; and/or one ~~white or yellow~~ light centered below the SLOW legend;
- D. A series of eight or more small ~~white or red~~ lights no larger than 1/4 inch in diameter along the outer edge of the paddle, arranged in an octagonal pattern at the eight corners of the border of the STOP face; and/ or a series of eight or more small ~~white or yellow~~ lights no larger than 1/4 inch in diameter along the outer edge of the paddle, arranged in a diamond pattern along the border of the SLOW face; or
- E. A series of ~~white~~ lights forming the shapes of the letters in the legend.

Standard:

06 If flashing lights are used on the STOP face of the paddle, their colors shall be ~~all white or all red~~. If flashing lights are used on the SLOW face of the paddle, their colors shall be ~~all white or all yellow~~.

07 If more than eight flashing lights are used, the lights shall be arranged such that they clearly convey the octagonal shape of the STOP face of the paddle and/or the diamond shape of the SLOW face of the paddle.

08 If flashing lights are used on the STOP/SLOW paddle, the flash rate shall be at least 50, but not more than 60, flashes per minute.

09 Flags, when used (for emergency situations only), shall be red or fluorescent orange/red in color, shall be a minimum of 24 inches square, and shall be securely fastened to a staff that is approximately 36 inches in length.

Guidance:

10 The free edge of a flag should be weighted so the flag will hang vertically, even in heavy winds.

Standard:

11 When used at nighttime (for emergency situations only), flags shall be retroreflectorized red.

Option:

12 When flagging in an emergency situation at night in a non-illuminated flagger station, a flagger may use a traffic baton made of a flashlight with a red glow cone to supplement the STOP/SLOW paddle or flag.

Standard:

13 When a flashlight is used for flagging in an emergency situation at night in a non-illuminated flagger station, the flagger shall hold the flashlight in the left hand, shall hold the paddle or flag in the right hand as shown in Figure 6E-3, and shall use the flashlight in the following manner to control approaching road users:

- A. To inform road users to stop, the flagger shall hold the flashlight with the left arm extended and pointed down toward the ground, and then shall slowly wave the flashlight in front of the body in a slow arc from left to right such that the arc reaches no farther than 45 degrees from vertical.
- B. To inform road users to proceed, the flagger shall point the flashlight at the vehicle's bumper, slowly aim the flashlight toward the open lane, then hold the flashlight in that position. The flagger shall not wave the flashlight.
- C. To alert or slow traffic, the flagger shall point the flashlight toward oncoming traffic and quickly wave the flashlight in a figure eight motion.

Section 6E.04 Automated Flagger Assistance Devices

Support:

01 Automated Flagger Assistance Devices (AFADs) enable a flagger(s) to be positioned out of the lane of traffic and are used to control road users through temporary traffic control zones. These devices are designed to be remotely operated either by a single flagger at one end of the TTC zone or at a central location, or by separate flaggers near each device's location.

02 There are two types of AFADs:

- A. An AFAD (see Section 6E.05) that uses a remotely controlled STOP/SLOW sign on either a trailer or a movable cart system to alternately control right-of-way.
- B. An AFAD (see Section 6E.06) that uses remotely controlled red and yellow lenses and a gate arm to alternately control right-of-way.

03 AFADs might be appropriate for short-term and intermediate-term activities (see Section 6G.02). Typical applications include TTC activities such as, but not limited to:

- A. Bridge maintenance;
- B. Haul road crossings; and
- C. Pavement patching.

Standard:

04 AFADs shall only be used in situations where there is only one lane of approaching traffic in the direction to be controlled.

05 When used at night, the AFAD location shall be illuminated in accordance with Section 6E.08.

Guidance:

06 AFADs should not be used for long-term stationary work (see Section 6G.02).

Standard:

07 Because AFADs are not traffic control signals, they shall not be used as a substitute for or a replacement for a continuously operating temporary traffic control signal as described in Section 6F.84.

08 AFADs shall meet the crashworthy performance criteria contained in Section 6F.01.

Guidance:

09 If used, AFADs should be located in advance of one-lane, two-way tapers and downstream from the point where approaching traffic is to stop in response to the device.

Standard:

10 If used, AFADs shall be placed so that all of the signs and other items controlling traffic movement are readily visible to the driver of the initial approaching vehicle with advance warning signs alerting other approaching traffic to be prepared to stop.

11 If used, an AFAD shall be operated only by a flagger (see Section 6E.01) who has been trained on the operation of the AFAD. The flagger(s) operating the AFAD(s) shall not leave the AFAD(s) unattended at any time while the AFAD(s) is being used.

12 The use of AFADs shall conform to one of the following methods:

A. An AFAD at each end of the TTC zone (Method 1), or

B. An AFAD at one end of the TTC zone and a flagger at the opposite end (Method 2).

13 Except as provided in Paragraph 14, two flaggers shall be used when using either Method 1 or Method 2.

Option:

14 A single flagger may simultaneously operate two AFADs (Method 1) or may operate a single AFAD on one end of the TTC zone while being the flagger at the opposite end of the TTC zone (Method 2) if both of the following conditions are present:

A. The flagger has an unobstructed view of the AFAD(s), and

B. The flagger has an unobstructed view of approaching traffic in both directions.

Guidance:

15 When an AFAD is used, the advance warning signing should include a ROAD WORK AHEAD (W20-1) sign, a ONE LANE ROAD (W20-4) sign, and a BE PREPARED TO STOP (W3-4) sign.

Standard:

16 When the AFAD is not in use, the signs associated with the AFAD, both at the AFAD location and in advance, shall be removed or covered.

Guidance:

17 A State or local agency that elects to use AFADs should adopt a policy, based on engineering judgment, governing AFAD applications. The policy should also consider more detailed and/or more restrictive requirements for AFAD use, such as the following:

A. Conditions applicable for the use of Method 1 and Method 2 AFAD operation,

B. Volume criteria,

C. Maximum distance between AFADs,

D. Conflicting lenses/indications monitoring requirements,

E. Fail safe procedures,

F. Additional signing and pavement markings,

G. Application consistency,

H. Larger signs or lenses to increase visibility, and

I. Use of backplates.

Section 6E.05 STOP/SLOW Automated Flagger Assistance Devices

Standard:

01 A STOP/SLOW Automated Flagger Assistance Device (AFAD) (see Section 6E.04) shall include a STOP/SLOW sign that alternately displays the STOP (R1-1) face and the SLOW (W20-8) face of a STOP/SLOW paddle (see Figure 6E-1).

02 The AFAD's STOP/SLOW sign shall have an octagonal shape, shall be fabricated of rigid material, and shall be mounted with the bottom of the sign a minimum of 6 feet above the pavement on an

appropriate support. The size of the STOP/SLOW sign shall be at least 24 x 24 inches with letters at least 8 inches high. The background of the STOP face shall be red with white letters and border. The background of the SLOW face shall be diamond shaped and orange with black letters and border. Both faces of the STOP/SLOW sign shall be retroreflectorized.

03 The AFAD's STOP/SLOW sign shall have a means to positively lock, engage, or otherwise maintain the sign assembly in a stable condition when set in the STOP or SLOW position.

04 The AFAD's STOP/SLOW sign shall be supplemented with active conspicuity devices by incorporating either:

A. ~~White or red flashing lights within the STOP face and white or yellow flashing lights within the SLOW face meeting the provisions contained in Section 6E.03;~~ or

B. A Stop Beacon (see Section 4L.05) mounted a maximum of 24 inches above the STOP face and a Warning Beacon (see Section 4L.03) mounted a maximum of 24 inches above, below, or to the side of the SLOW face. The Stop Beacon shall not be flashed or illuminated when the SLOW face is displayed, and the Warning Beacon shall not be flashed or illuminated when the STOP face is displayed. Except for the mounting locations, the beacons shall comply with the provisions of Chapter 4L.

Option:

05 Type B warning light(s) (see Section 6F.83) may be used in lieu of the Warning Beacon during the display of the SLOW face of the AFAD's STOP/SLOW sign.

Standard:

06 If Type B warning lights are used in lieu of a Warning Beacon, they shall flash continuously when the SLOW face is displayed and shall not be flashed or illuminated when the STOP face is displayed.

Option:

07 The faces of the AFAD's STOP/SLOW sign may include louvers to improve the stability of the device in windy or other adverse environmental conditions.

Standard:

08 If louvers are used, the louvers shall be designed such that the full sign face is visible to approaching traffic at a distance of 50 feet or greater.

Guidance:

09 *The STOP/SLOW AFAD should include a gate arm that descends to a down position across the approach lane of traffic when the STOP face is displayed and then ascends to an upright position when the SLOW face is displayed.*

Option:

10 In lieu of a stationary STOP/SLOW sign with a separate gate arm, the STOP/SLOW sign may be attached to a mast arm that physically blocks the approach lane of traffic when the STOP face is displayed and then moves to a position that does not block the approach lane when the SLOW face is displayed.

Standard:

11 Gate arms, if used, shall be fully retroreflectorized on both sides, and shall have vertical alternating red and white stripes at 16-inch intervals measured horizontally as shown in Figure 8C-1. When the arm is in the down position blocking the approach lane:

A. The minimum vertical aspect of the arm and sheeting shall be 2 inches; and

B. The end of the arm shall reach at least to the center of the lane being controlled.

12 A WAIT ON STOP (R1-7) sign (see Figure 6E-1) shall be displayed to road users approaching the AFAD.

Option:

13 A GO ON SLOW (R1-8) sign (see Figure 6E-1) may also be displayed to road users approaching the AFAD.

Standard:

14 The GO ON SLOW sign, if used, and the WAIT ON STOP sign shall be positioned on the same support structure as the AFAD or immediately adjacent to the AFAD such that they are in the same direct line of view of approaching traffic as the sign faces of the AFAD. Both signs shall have black legends and borders on white backgrounds. Each of these signs shall be rectangular in shape and each shall be at least 24 x 30 inches in size with letters at least 6 inches high.

15 To inform road users to stop, the AFAD shall display the STOP face and the red or white lights, if used, within the STOP face shall flash or the Stop Beacon shall flash. To inform road users to proceed, the

AFAD shall display the SLOW face and the yellow ~~or white~~ lights, if used, within the SLOW face shall flash or the Warning Beacon or the Type B warning lights shall flash.

¹⁶ If STOP/SLOW AFADs are used to control traffic in a one-lane, two-way TTC zone, safeguards shall be incorporated to prevent the flagger(s) from simultaneously displaying the SLOW face at each end of the TTC zone. Additionally, the flagger(s) shall not display the AFAD's SLOW face until all oncoming vehicles have cleared the one-lane portion of the TTC zone.

Section 6E.06 Red/Yellow Lens Automated Flagger Assistance Devices

Standard:

⁰¹ A Red/Yellow Lens Automated Flagger Assistance Device (AFAD) (see Section 6E.04) shall alternately display a steadily illuminated CIRCULAR RED lens and a flashing CIRCULAR YELLOW lens to control traffic without the need for a flagger in the immediate vicinity of the AFAD or on the roadway (see Figure 6E-2).

⁰² Red/Yellow Lens AFADs shall have at least one set of CIRCULAR RED and CIRCULAR YELLOW lenses that are 12 inches in diameter. Unless otherwise provided in this Section, the lenses and their arrangement, CIRCULAR RED on top and CIRCULAR YELLOW below, shall comply with the applicable provisions for traffic signal indications in Part 4. If the set of lenses is post-mounted, the bottom of the housing (including brackets) shall be at least 7 feet above the pavement. If the set of lenses is located over any portion of the highway that can be used by motor vehicles, the bottom of the housing (including brackets) shall be at least 15 feet above the pavement.

Option:

⁰³ Additional sets of CIRCULAR RED and CIRCULAR YELLOW lenses, located over the roadway or on the left-hand side of the approach and operated in unison with the primary set, may be used to improve visibility and/or conspicuity of the AFAD.

Standard:

⁰⁴ A Red/Yellow Lens AFAD shall include a gate arm that descends to a down position across the approach lane of traffic when the steady CIRCULAR RED lens is illuminated and then ascends to an upright position when the flashing CIRCULAR YELLOW lens is illuminated. The gate arm shall be fully retroreflectorized on both sides, and shall have vertical alternating red and white stripes at 16-inch intervals measured horizontally as shown in Figure 8C-1. When the arm is in the down position blocking the approach lane:

A. The minimum vertical aspect of the arm and sheeting shall be 2 inches; and

B. The end of the arm shall reach at least to the center of the lane being controlled.

⁰⁵ A Stop Here On Red (R10-6 or R10-6a) sign (see Section 2B.53) shall be installed on the right-hand side of the approach at the point at which drivers are expected to stop when the steady CIRCULAR RED lens is illuminated (see Figure 6E-2).

⁰⁶ To inform road users to stop, the AFAD shall display a steadily illuminated CIRCULAR RED lens and the gate arm shall be in the down position. To inform road users to proceed, the AFAD shall display a flashing CIRCULAR YELLOW lens and the gate arm shall be in the upright position.

⁰⁷ If Red/Yellow Lens AFADs are used to control traffic in a one-lane, two-way TTC zone, safeguards shall be incorporated to prevent the flagger(s) from actuating a simultaneous display of a flashing CIRCULAR YELLOW lens at each end of the TTC zone. Additionally, the flagger shall not actuate the AFAD's display of the flashing CIRCULAR YELLOW lens until all oncoming vehicles have cleared the one-lane portion of the TTC zone.

⁰⁸ A change interval shall be provided as the transition between the display of the flashing CIRCULAR YELLOW indication and the display of the steady CIRCULAR RED indication. During the change interval, the CIRCULAR YELLOW lens shall be steadily illuminated. The gate arm shall remain in the upright position during the display of the steadily illuminated CIRCULAR YELLOW change interval.

⁰⁹ A change interval shall not be provided between the display of the steady CIRCULAR RED indication and the display of the flashing CIRCULAR YELLOW indication.

Guidance:

¹⁰ *The steadily illuminated CIRCULAR YELLOW change interval should have a duration of at least 5 seconds, unless a different duration, within the range of durations recommended by Section 4D.26, is justified by engineering judgment.*

Section 6E.07 Flagger Procedures

Support:

⁰¹ The use of paddles and flags by flaggers is illustrated in Figure 6E-3.

Standard:

⁰² **Flaggers shall use a STOP/SLOW paddle, a flag (for emergency situations only), or an Automated Flagger Assistance Device (AFAD) to control road users approaching a TTC zone. The use of hand movements alone without a paddle, flag, or AFAD to control road users shall be prohibited except for law enforcement personnel or emergency responders at incident scenes as described in Section 6I.01.**

⁰³ **The following methods of signaling with paddles shall be used:**

- A. To stop road users, the flagger shall face road users and aim the STOP paddle face toward road users in a stationary position with the arm extended horizontally away from the body. The free arm shall be held with the palm of the hand above shoulder level toward approaching traffic.**
- B. To direct stopped road users to proceed, the flagger shall face road users with the SLOW paddle face aimed toward road users in a stationary position with the arm extended horizontally away from the body. The flagger shall motion with the free hand for road users to proceed.**
- C. To alert or slow traffic, the flagger shall face road users with the SLOW paddle face aimed toward road users in a stationary position with the arm extended horizontally away from the body.**

Option:

⁰⁴ To further alert or slow traffic, the flagger holding the SLOW paddle face toward road users may motion up and down with the free hand, palm down.

Standard:

⁰⁵ **The following methods of signaling with a flag (for emergency situations only) shall be used:**

- A. To stop road users, the flagger shall face road users and extend the flag staff horizontally across the road users' lane in a stationary position so that the full area of the flag is visibly hanging below the staff. The free arm shall be held with the palm of the hand above shoulder level toward approaching traffic.**
- B. To direct stopped road users to proceed, the flagger shall face road users with the flag and arm lowered from the view of the road users, and shall motion with the free hand for road users to proceed. Flags shall not be used to signal road users to proceed.**
- C. To alert or slow traffic, the flagger shall face road users and slowly wave the flag in a sweeping motion of the extended arm from shoulder level to straight down without raising the arm above a horizontal position. The flagger shall keep the free hand down.**

Guidance:

⁰⁶ *The flagger should stand either on the shoulder adjacent to the road user being controlled or in the closed lane prior to stopping road users. A flagger should only stand in the lane being used by moving road users after road users have stopped. The flagger should be clearly visible to the first approaching road user at all times. The flagger also should be visible to other road users. The flagger should be stationed sufficiently in advance of the workers to warn them (for example, with audible warning devices such as horns or whistles) of approaching danger by out-of-control vehicles. The flagger should stand alone, away from other workers, work vehicles, or equipment.*

Option:

⁰⁷ At spot lane closures where adequate sight distance is available for the reasonably safe handling of traffic, the use of one flagger may be sufficient.

Guidance:

⁰⁸ *When a single flagger is used, the flagger should be stationed on the shoulder opposite the spot lane closure or work space, or in a position where good visibility and traffic control can be maintained at all times.*

Section 6E.08 Flagger Stations

Standard:

01 **Flagger stations shall be located such that approaching road users will have sufficient distance to stop at an intended stopping point.**

Option:

02 The distances shown in Table 6E-1, which provides information regarding the stopping sight distance as a function of speed, may be used for the location of a flagger station. These distances may be increased for downgrades ([Table 6E-101\(CA\)](#)) and other conditions that affect stopping distance.

Guidance:

03 *Flagger stations should be located such that an errant vehicle has additional space to stop without entering the work space. The flagger should identify an escape route that can be used to avoid being struck by an errant vehicle.*

Standard:

04 **Except in emergency situations, flagger stations shall be preceded by an advance warning sign or signs. Except in emergency situations, flagger stations shall be illuminated at night.**

Support:

05 Refer to Construction Safety Orders in the California Code of Regulations (Title 8, Division 1, Chapter 4, Subchapter 4, Article 3, Section 1523 – Illumination and Section 1599 - Flaggers). See Section 1A.11 for information regarding this publication.

Figure 6E-1. Example of the Use of a STOP/SLOW Automated Flagger Assistance Device (AFAD)

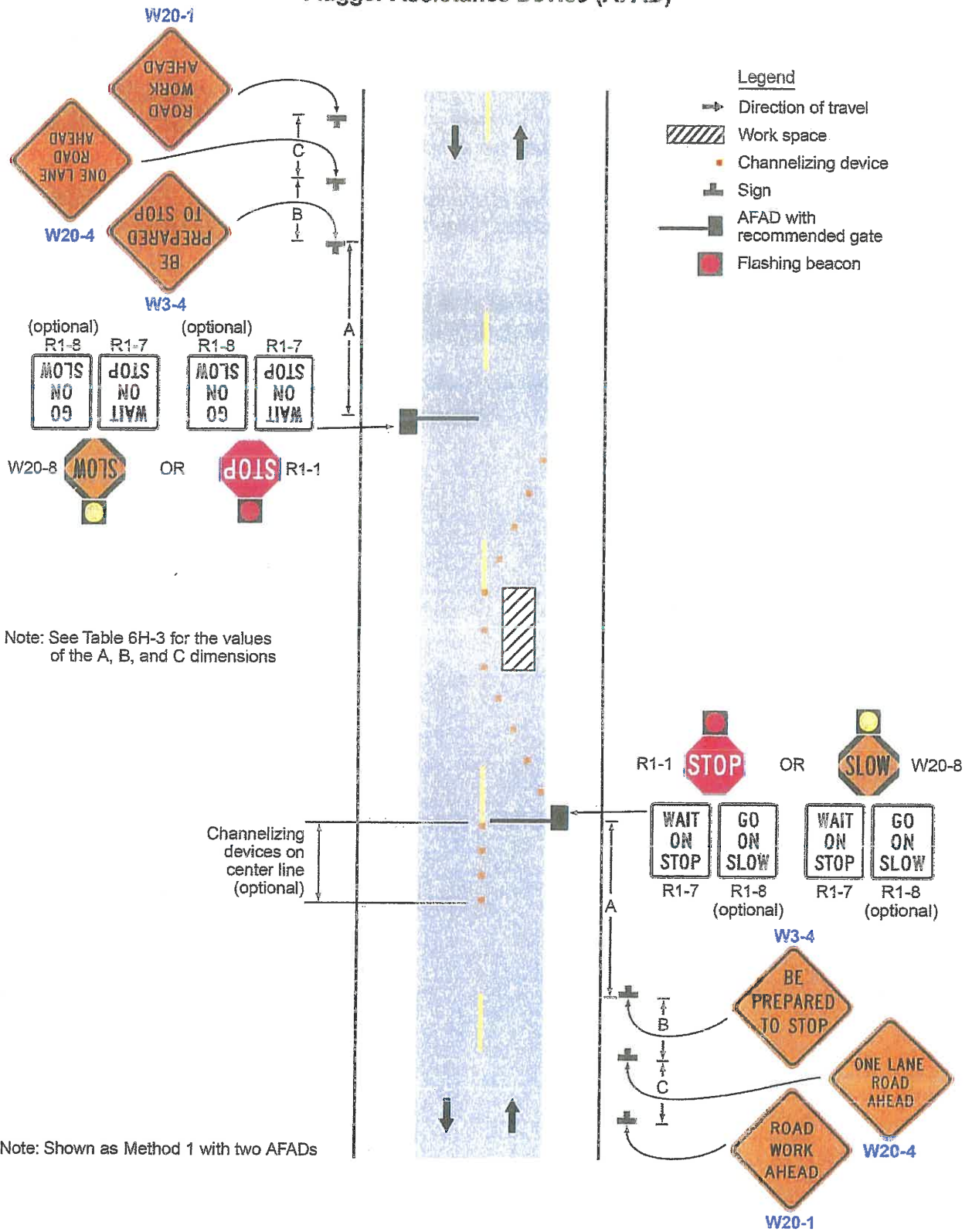


Figure 6E-2. Example of the Use of a Red/Yellow Lens Automated Flagger Assistance Device (AFAD)

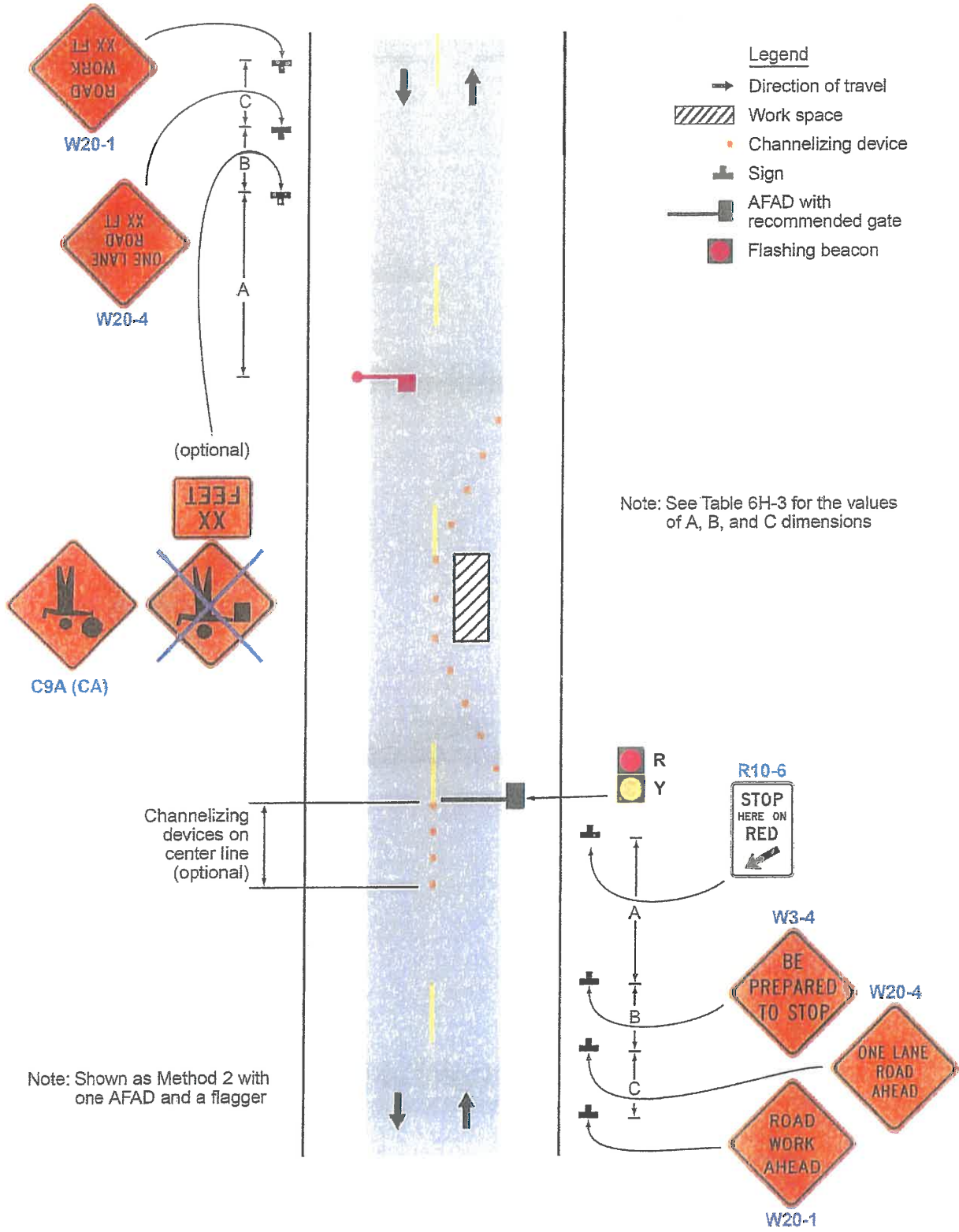


Figure 6E-3. Use of Hand-Signaling Devices by Flaggers

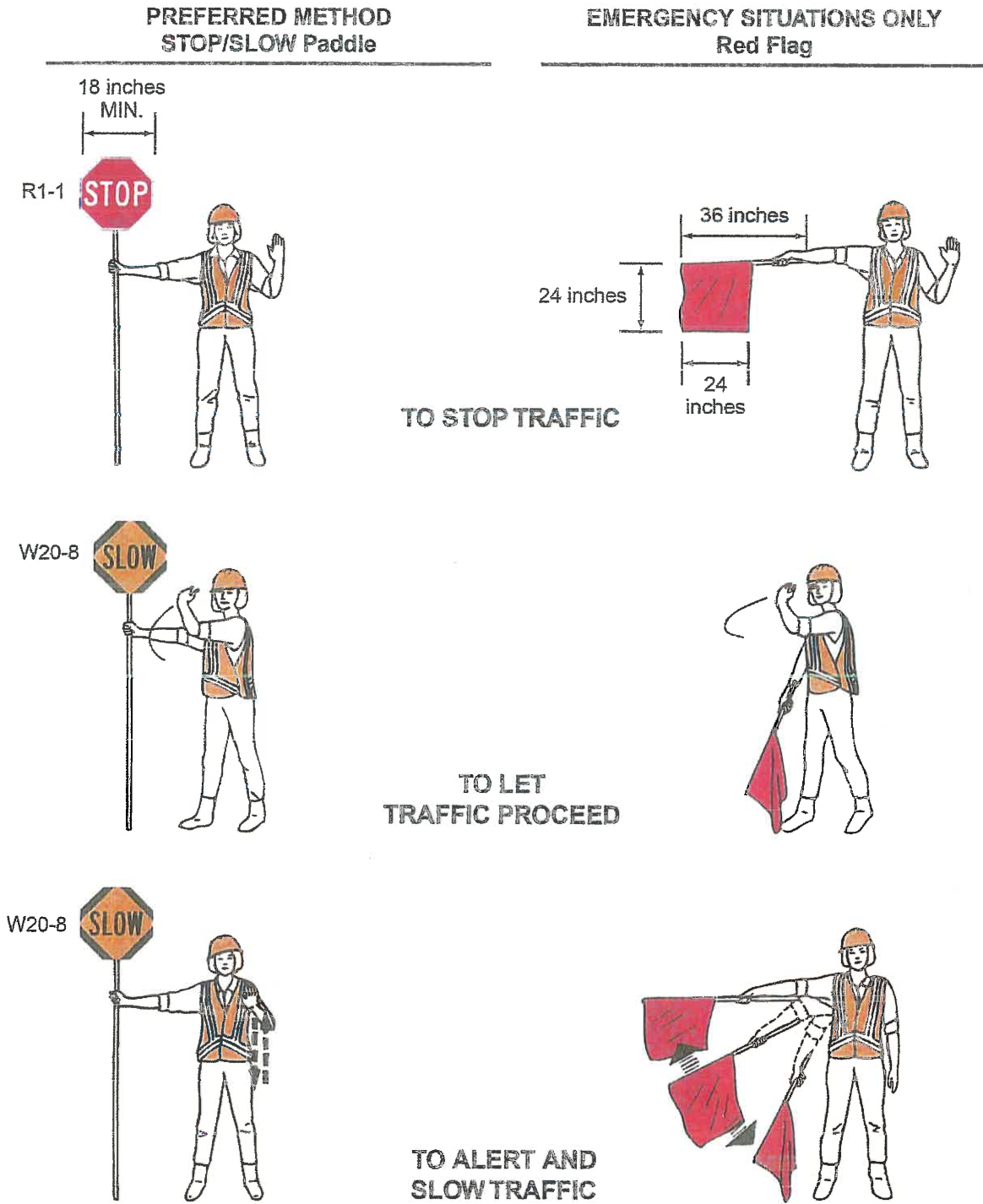


Table 6E-1. Stopping Sight Distance as a Function of Speed on Level Roads.
 (Used as suggested longitudinal buffer space length or location for flagger station)

Speed*	Distance
20 mph	115 feet
25 mph	155 feet
30 mph	200 feet
35 mph	250 feet
40 mph	305 feet
45 mph	360 feet
50 mph	425 feet
55 mph	495 feet
60 mph	570 feet
65 mph	645 feet
70 mph	730 feet
75 mph	820 feet

* Posted speed, off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed in mph.

Table 6E-101(CA). Stopping Sight Distance as a Function of Speed on Downgrades.
 (Used as suggested longitudinal buffer space length or location for flagger station)

Speed (mph)	% Downgrade (Buffer Space)		
	-3% (feet)	-6% (feet)	-9% (feet)
20	116	120	126
25	158	165	173
30	205	215	227
35	257	271	287
40	315	333	354
45	378	400	427
50	446	474	507
55	520	553	593
60	598	638	686
65	682	728	785
70	771	825	891
75	866	927	1003

* Exhibit 3-2. A Policy on Geometric Design of Highways and Streets, AASHTO, 2001, p.115.

CHAPTER 6F. TEMPORARY TRAFFIC CONTROL ZONE DEVICES

Section 6F.01 Types of Devices

Guidance:

01 *The design and application of TTC devices used in TTC zones should consider the needs of all road users (motorists, bicyclists, and pedestrians), including those with disabilities.*

Support:

02 FHWA policy requires that all roadside appurtenances such as traffic barriers, barrier terminals and crash cushions, bridge railings, sign and light pole supports, and work zone hardware used on the National Highway System meet the crashworthy performance criteria contained in the National Cooperative Highway Research Program (NCHRP) Report 350, "Recommended Procedures for the Safety Performance Evaluation of Highway Features." The FHWA website at "<http://safety.fhwa.dot.gov/programs/roadsideHardware.htm>" identifies all such hardware and includes copies of FHWA acceptance letters for each of them. In the case of proprietary items, links are provided to manufacturers' websites as a source of detailed information on specific devices. The website also contains an "Ask the Experts" section where questions on roadside design issues can be addressed.

03 Various Sections of the MUTCD require certain traffic control devices, their supports, and/or related appurtenances to be crashworthy. Such MUTCD crashworthiness provisions apply to all streets, highways, and private roads open to public travel (see definition in Section 1A.13). Also, State Departments of Transportation and local agencies might have expanded the NCHRP Report 350 crashworthy criteria to apply to certain other roadside appurtenances.

04 Crashworthiness and crash testing information on devices described in Part 6 are found in AASHTO's "Roadside Design Guide" (see Section 1A.11).

05 As defined in Section 1A.13, "crashworthy" is a characteristic of a roadside appurtenance that has been successfully crash tested in accordance with a national standard such as the NCHRP Report 350, "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

Standard:

06 **Traffic control devices shall be defined as all signs, signals, markings, and other devices used to regulate, warn, or guide road users, placed on, over, or adjacent to a street, highway, private roads open to public travel (see definition in Section 1A.13), pedestrian facility, or bikeway by authority of a public body or official having jurisdiction.**

07 **All traffic control devices used for construction, maintenance, utility, or incident management operations on a street, highway, or private road open to public travel (see definition in Section 1A.13) shall comply with the applicable provisions of this Manual.**

08 **Caltrans shall implement NCHRP 350 criteria for crashworthy TTC devices in TTC zones on all State highways effective as of December 1, 2005. Crashworthiness of TTC devices shall be substantiated. When no longer needed, TTC devices shall be removed from the TTC zone.**

09 **Crashworthiness of TTC devices shall be substantiated as follows:**

10 **Category 1 devices purchased after October 1, 1998 shall be employed based on the vendor's self-certification. Self-certification shall be based on crash testing, crash testing of similar devices, or years of demonstrable safe performance.**

11 **Category 2 devices shall be on FHWA's list of Acceptable Crashworthy Category 2 Hardware for Work Zones which meet NCHRP Report 350 criteria for crashworthiness. Category 2 devices that have not received FHWA acceptance and were purchased before October 1, 2000, shall not be used. Category 2 devices in use that have received FHWA acceptance shall be labeled with the FHWA acceptance letter number and the name of the manufacturer by the start of the project. The label shall be readable and permanently affixed by the manufacturer. Category 2 devices without a label shall not be used in highway work zones.**

12 **Category 3 devices shall be crash tested in accordance with NCHRP Report 350 criteria. Caltrans shall include Standard Special Provision (SSP) 12-000, Standard Plans and construction details in all contract documents.**

Support:

13 **For Category 3, the compliance date was October 1, 1998 for truck mounted attenuators and work zone crash cushions. The compliance date for other Category 3 devices was October 1, 2002.**

Figure 6F-1. Height and Lateral Location of Signs—Typical Installations

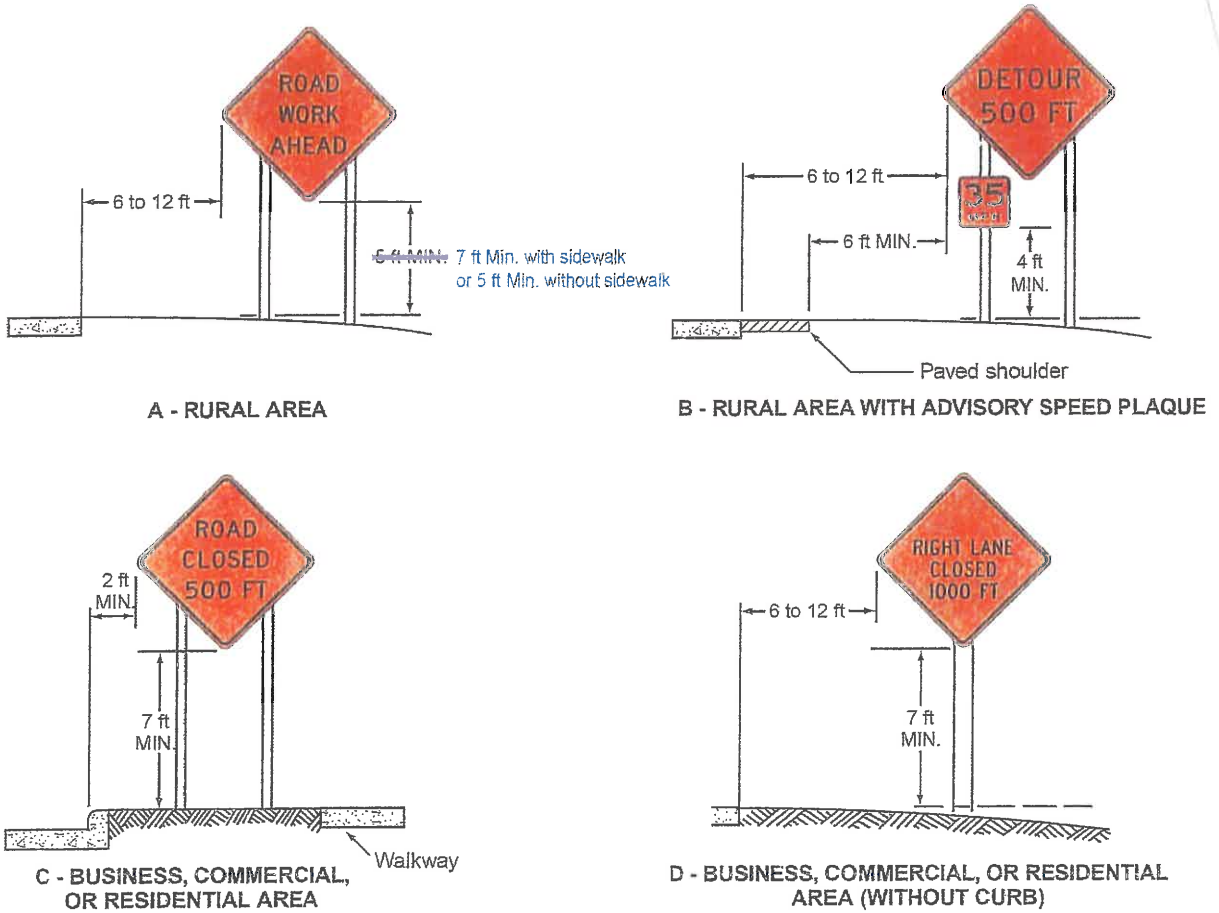


Figure 6F-2. Methods of Mounting Signs Other Than on Posts

RED
24 x 24
Orange for
Trees

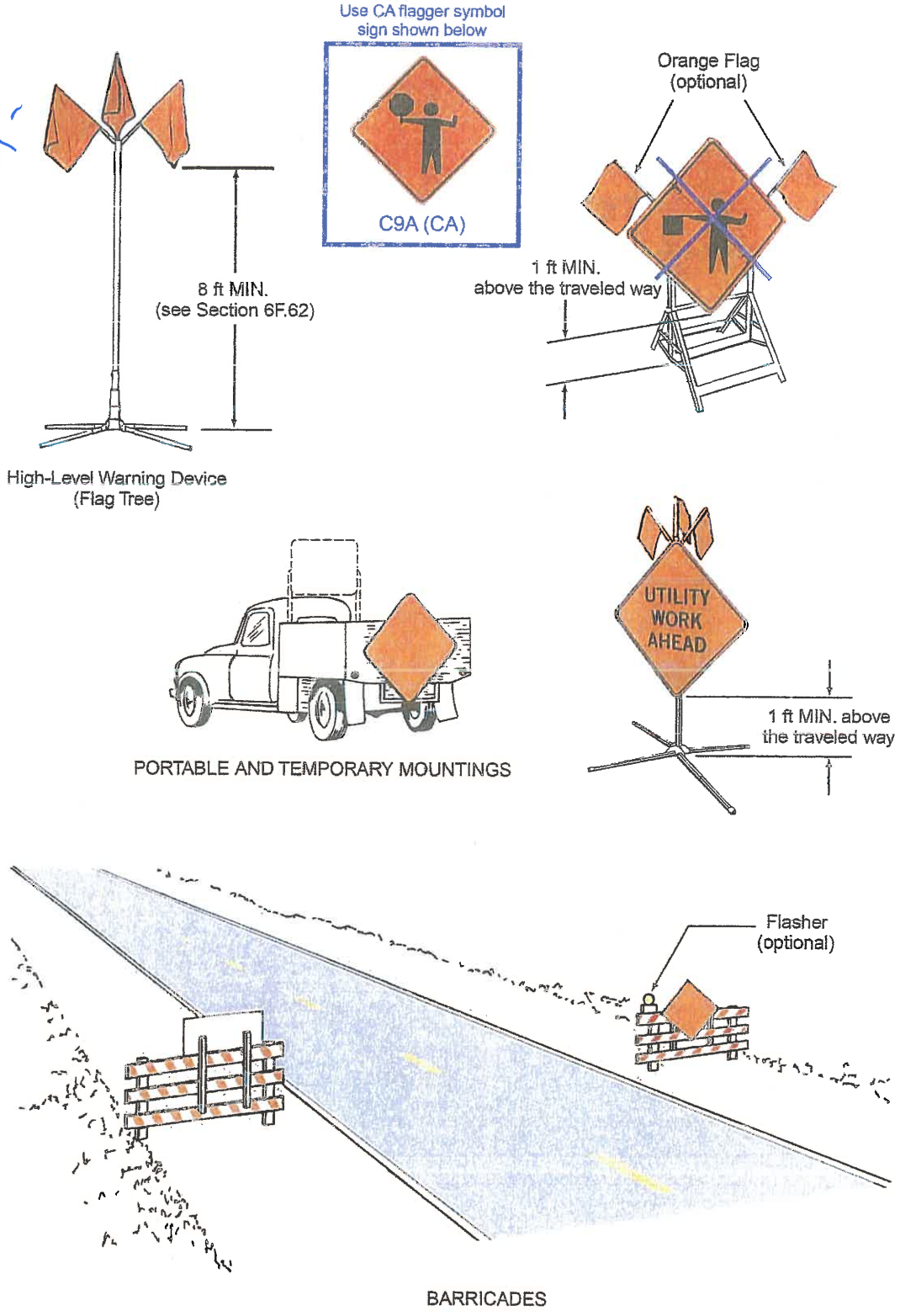


Figure 6F-3. Regulatory Signs and Plaques in Temporary Traffic Control Zones
 (Sheet 1 of 2)

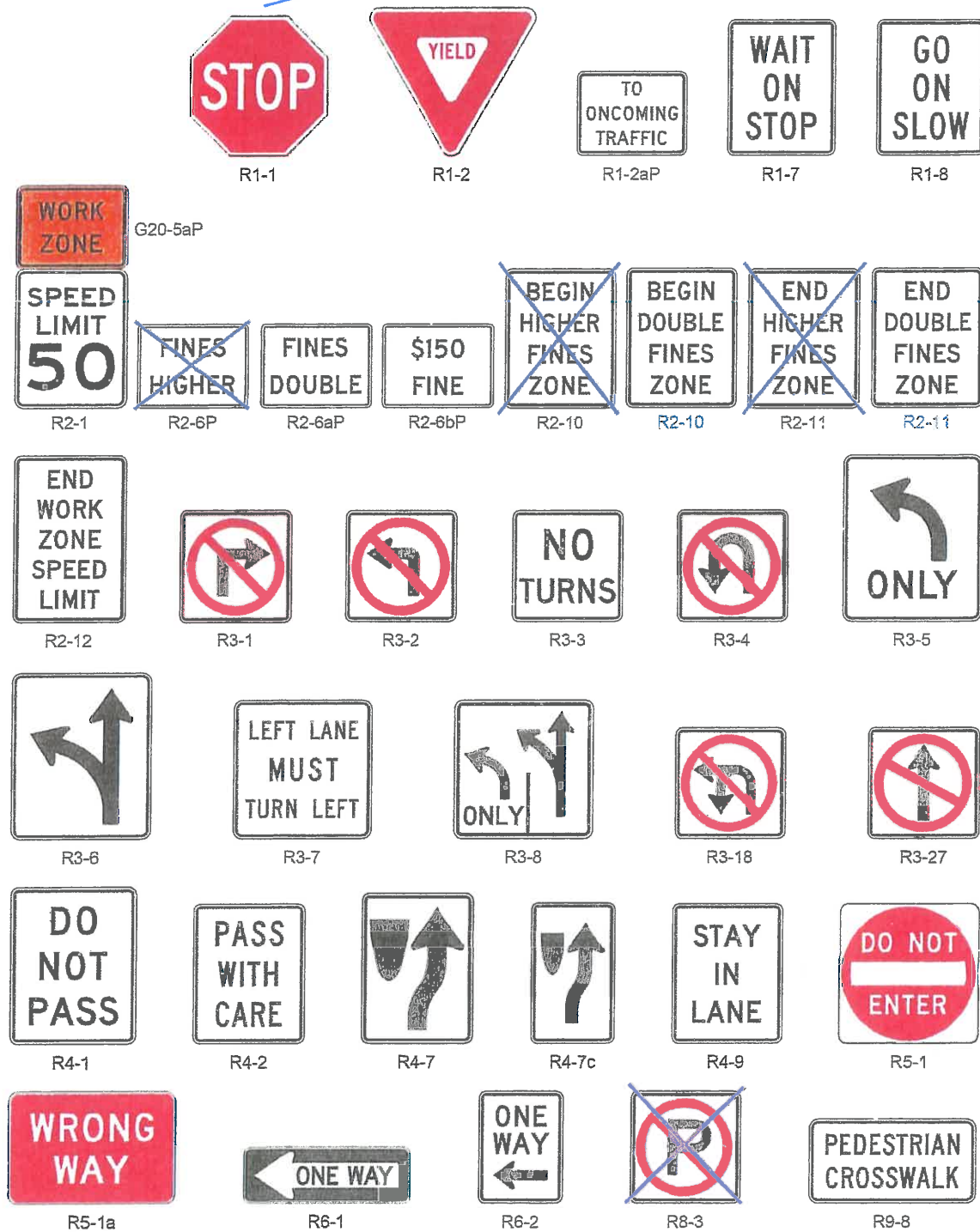


Figure 6F-3. Regulatory Signs and Plaques in Temporary Traffic Control Zones
(Sheet 2 of 2)

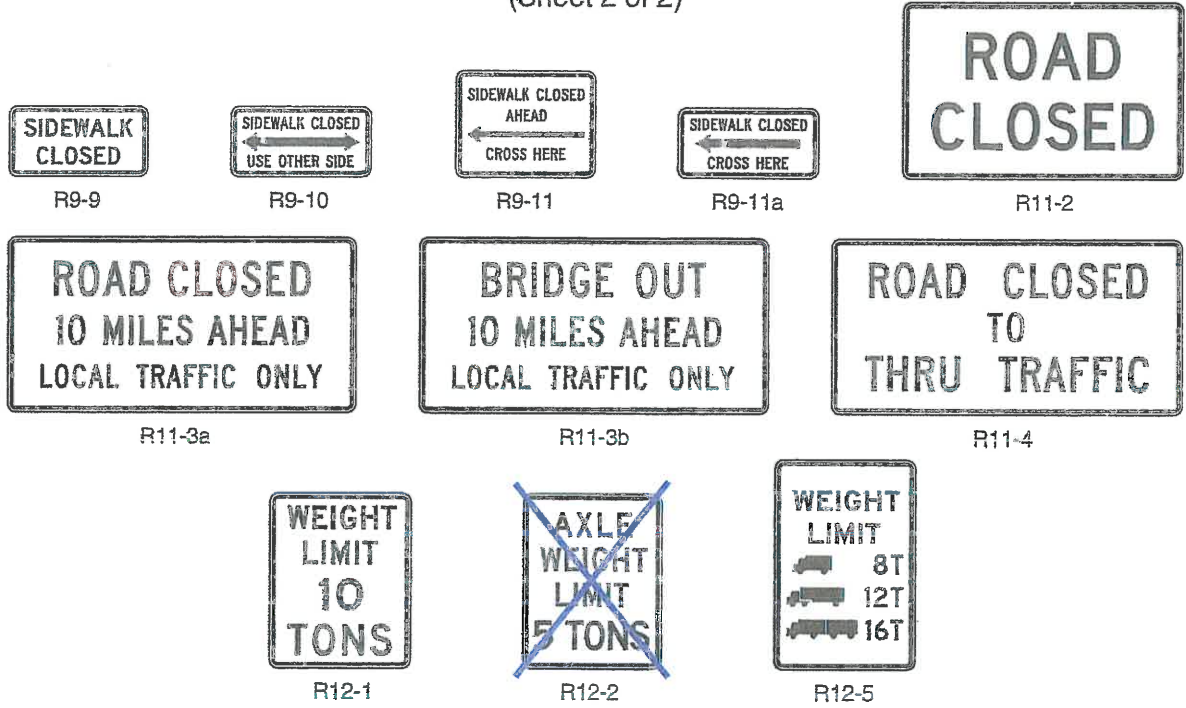


Figure 6F-4. Warning Signs and Plaques in Temporary Traffic Control Zones
 (Sheet 1 of 3)



Figure 6F-4. Warning Signs and Plaques in Temporary Traffic Control Zones
(Sheet 2 of 3)

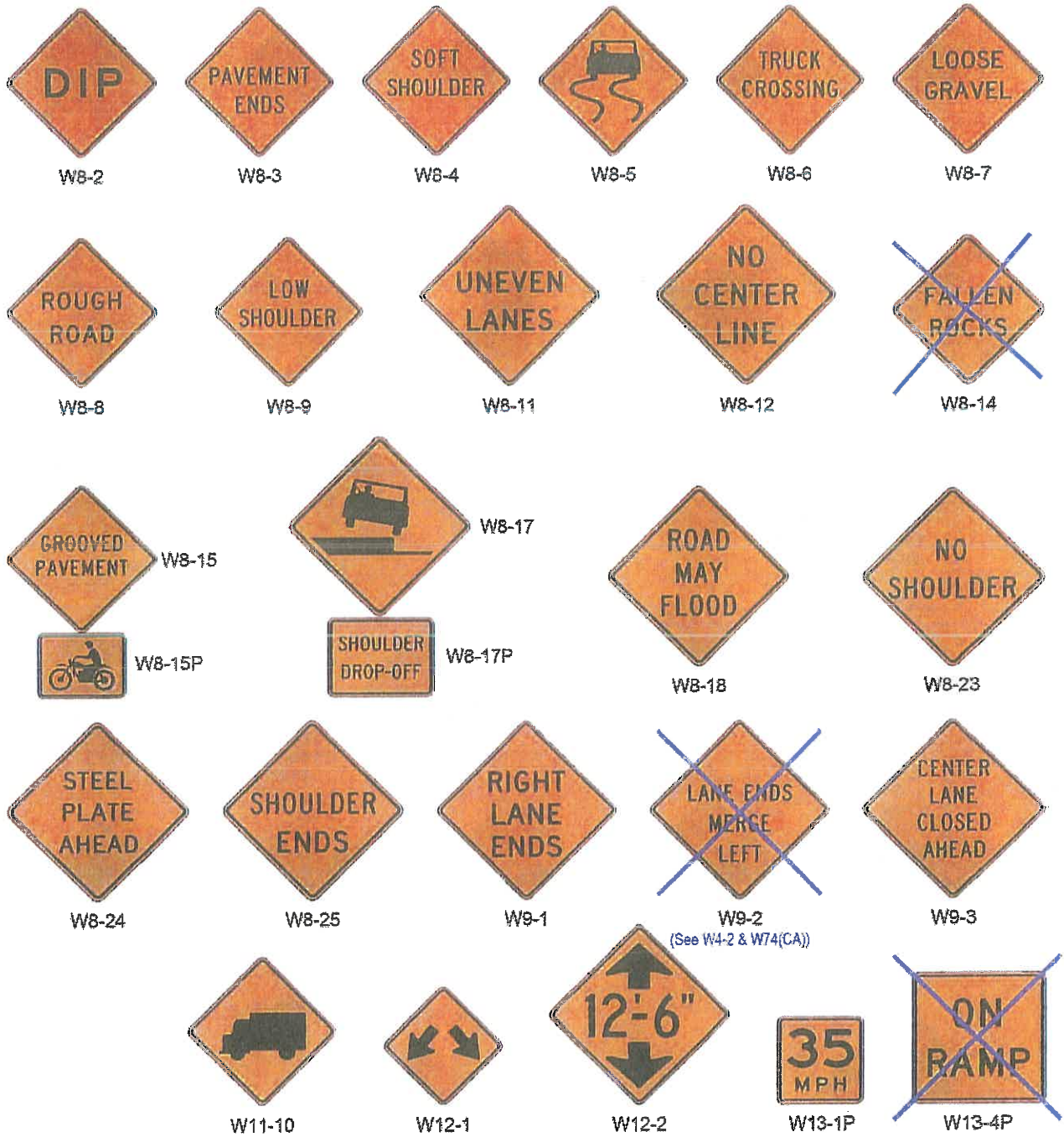
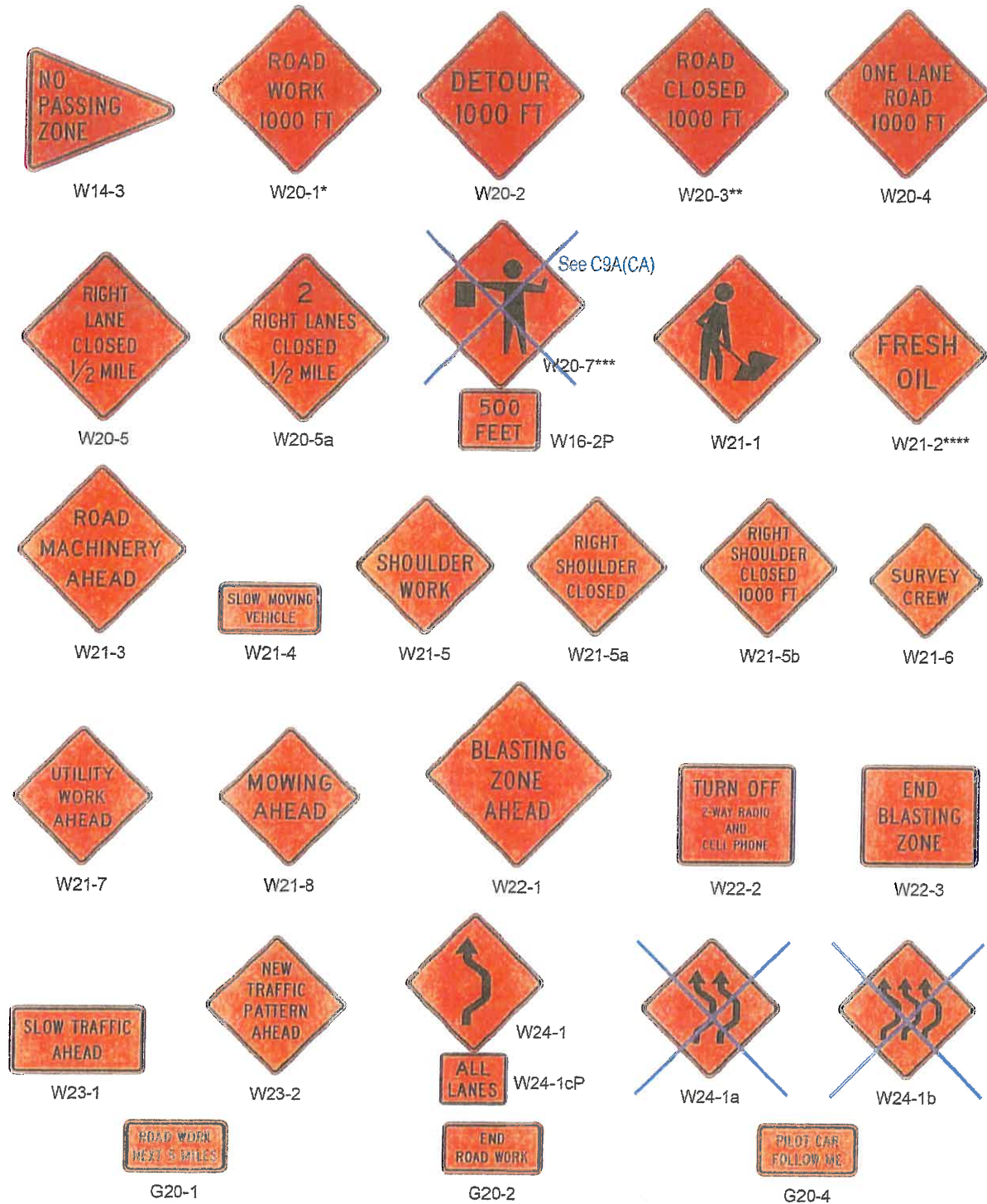


Figure 6F-4. Warning Signs and Plaques in Temporary Traffic Control Zones (Sheet 3 of 3)



* An optional STREET WORK word message sign is shown in the "Standard Highway Signs and Markings" book.
 ** An optional STREET CLOSED word message sign is shown in the "Standard Highway Signs and Markings" book.
 *** An optional FLAGGER (W20-7a) word message sign is shown in the "Standard Highway Signs and Markings" book.
 **** An optional FRESH TAR word message sign is shown in the "Standard Highway Signs and Markings" book.

Figure 6F-5. Exit Open and Closed and Detour Signs

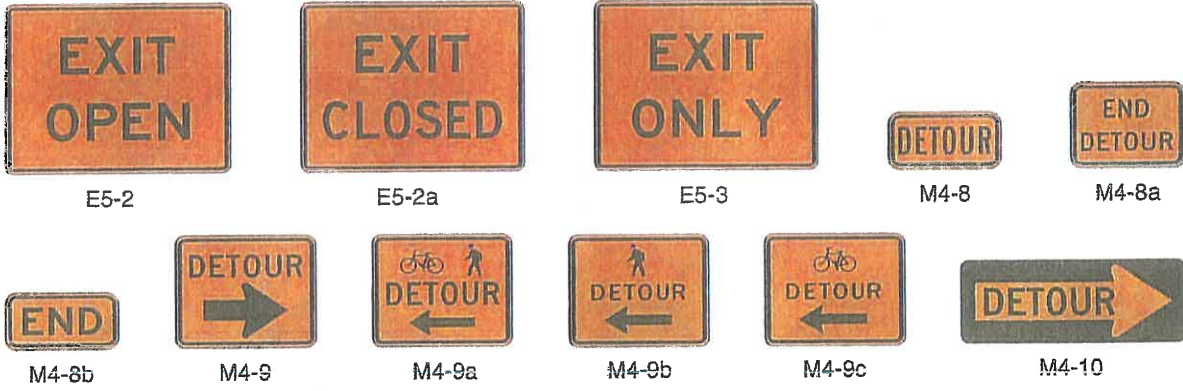

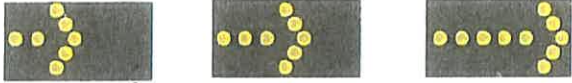








Figure 6F-6. Advance Warning Arrow Board Display Specifications

Operating Mode	Display (Type C arrow board illustrated)
1. At least one of the three following modes shall be provided:	(right arrow shown; left is similar)
Flashing Arrow	 Merge Right
Sequential Arrow	 Merge Right
Sequential Chevron	 Merge Right
2. The following mode shall be provided:	
Flashing Double Arrow	 Merge Right or Left
3. At least one of the following modes shall be provided: Flashing Caution or Alternating Diamond Caution	 or  or  

Arrow Board Type	Minimum Size	Minimum Legibility Distance	Minimum Number of Elements	Appropriate Use***
A	48 x 24 inches	1/2 mile	12	Low-speed urban streets
B	60 x 30 inches	3/4 mile	13	Intermediate-speed facilities and maintenance or mobile operations on high-speed roadways
II**	72 x 36 inches*	3/4 mile	13	Use in place of Type B or C
C or I	96 x 48 inches	1 mile	15	High-speed, high volume roadways
D	None*	1/2 mile	12	On authorized vehicles

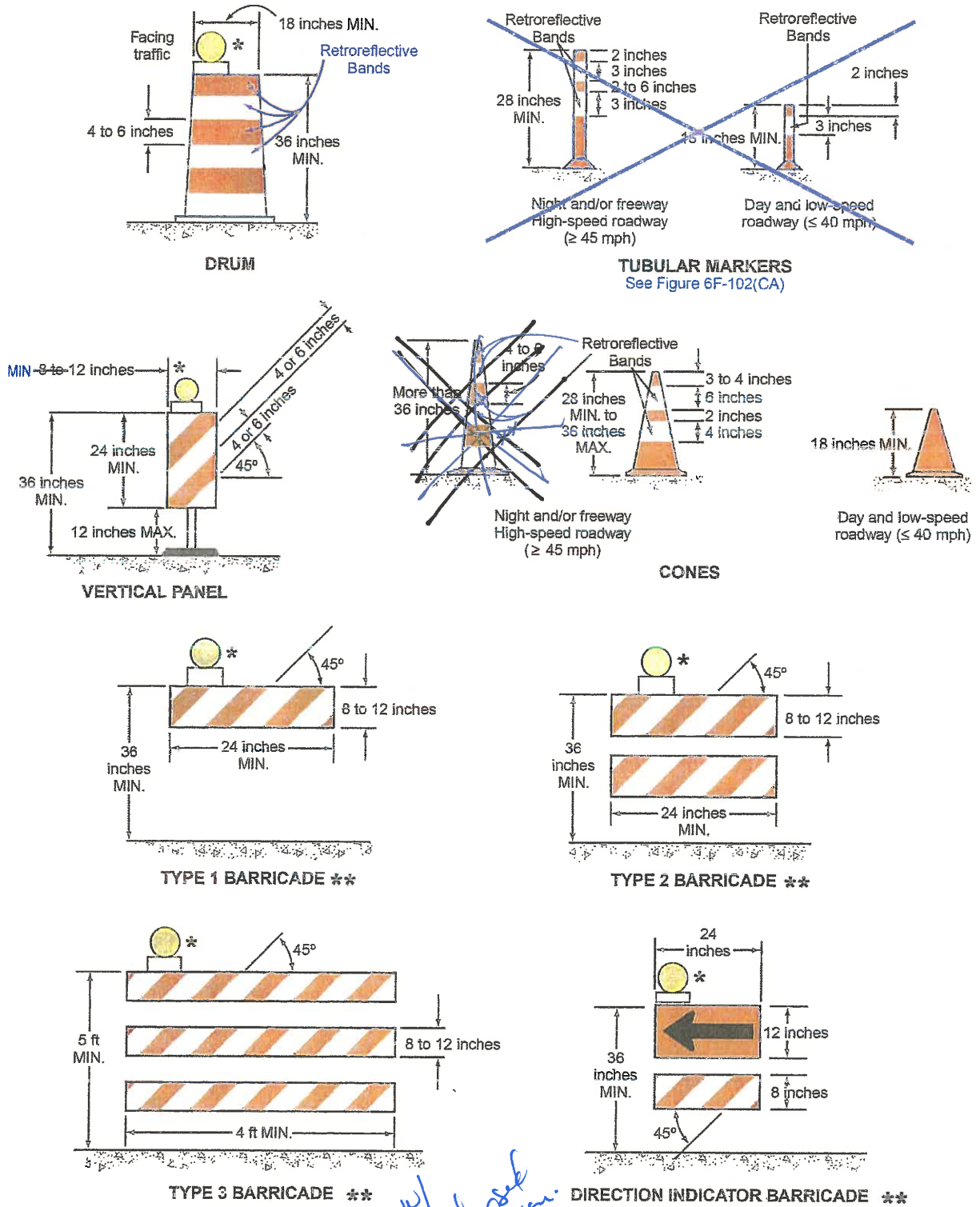
*Length of arrow equals 48 inches, width of arrowhead equals 24 inches

Standard:

** For State highways, the panel Type B shall be replaced by Type II.

*** See Section 6F.61 for more details.

Figure 6F-7. Channelizing Devices



* Warning lights (optional)

** Rail stripe widths shall be 6 inches, except that 4-inch wide stripes may be used if rail lengths are less than 36 inches. The sides of barricades facing traffic shall have retroreflective rail faces.

w/ Rd closed sign
 Add specification ie, rd closed to thru traffic.

Figure 6F-101 (CA). California Temporary Traffic Control Signs
(Sheet 1 of 2)



C2 (CA)



C9A (CA)



C12 (CA)



C19 (CA)



C20 (CA)



C20A (CA)



C20B (CA)



C23 (CA)



C23B (CA)



C24 (CA)



C27 (CA)



C29 (CA)



C30 (CA)



C30A (CA)



C31A (CA)



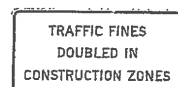
C37 (CA)



C37 (CA)



C38 (CA)



C40 (CA)



C40A (CA)



C43 (CA)



C44 (CA)



C45 (CA)



C46 (CA)



C46P (CA)



**Figure 6F-101 (CA). California Temporary Traffic Control Signs
 (Sheet 2 of 2)**

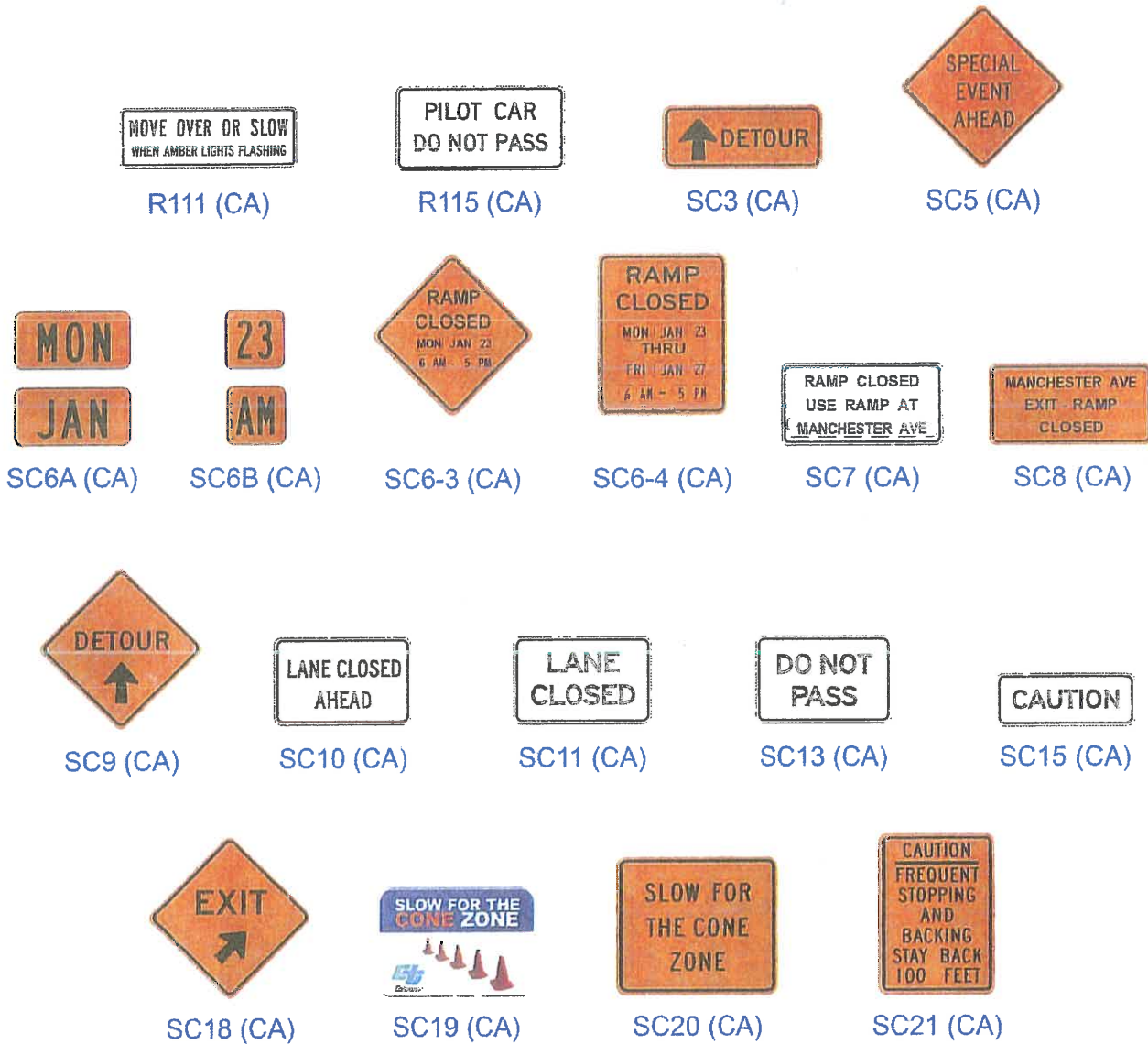
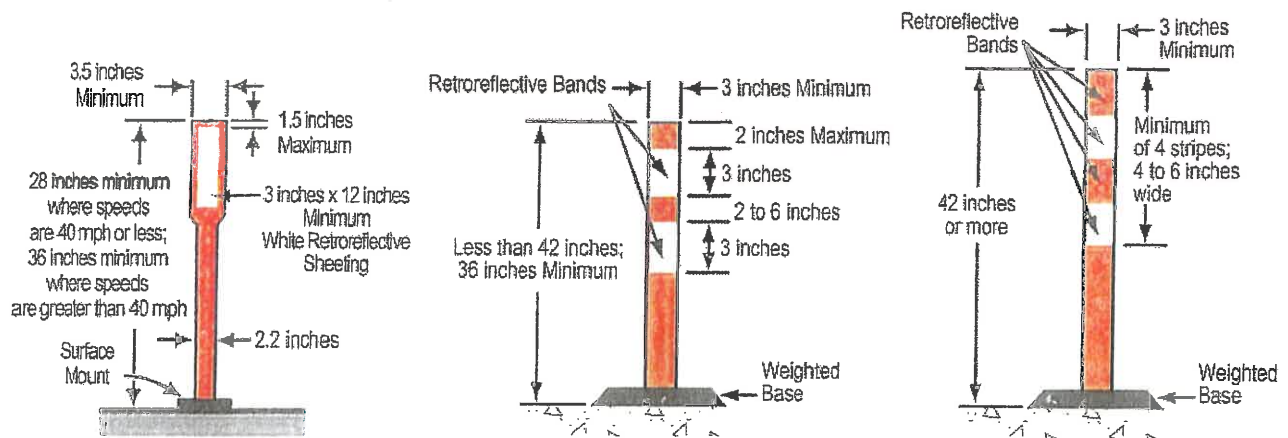
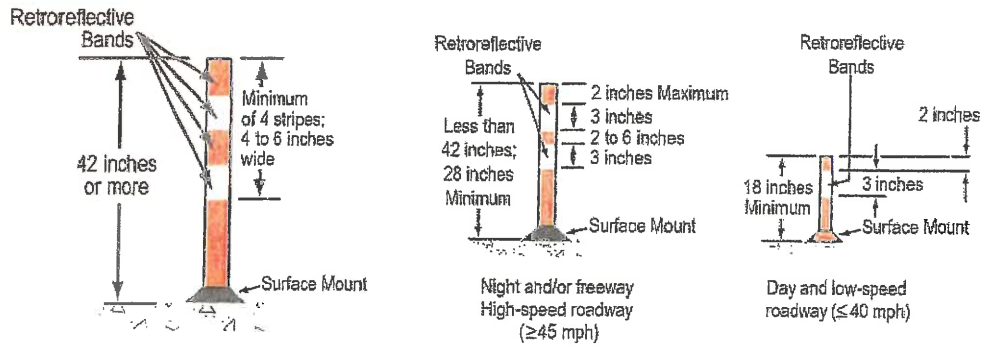


Figure 6F-102 (CA). Tubular Markers



Channelizer (CA)
 (Tubular marker with flattened top and affixed to pavement)

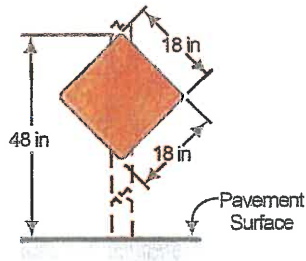
Portable Delineator
 (Tubular marker with weighted base, not affixed to pavement)



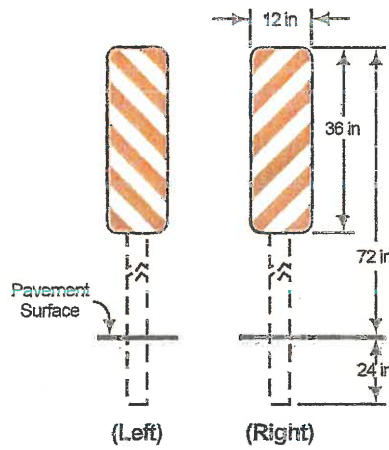
Tubular Marker (Affixed to pavement)

Figure 6F-103 (CA). Examples of Object Markers in Temporary Traffic Control Zones

Type N-3 (CA) Object Marker (OM1-3)



Type P (CA) Object Markers (OM-3L&R)



Type R (CA) Object Marker (OM-3C)

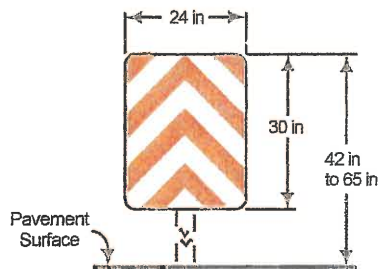


Figure 6F-104(CA) Typical Layout Using Channelizing Devices to Delineate a Portable Changeable Message Sign or Arrow Board on Shoulder

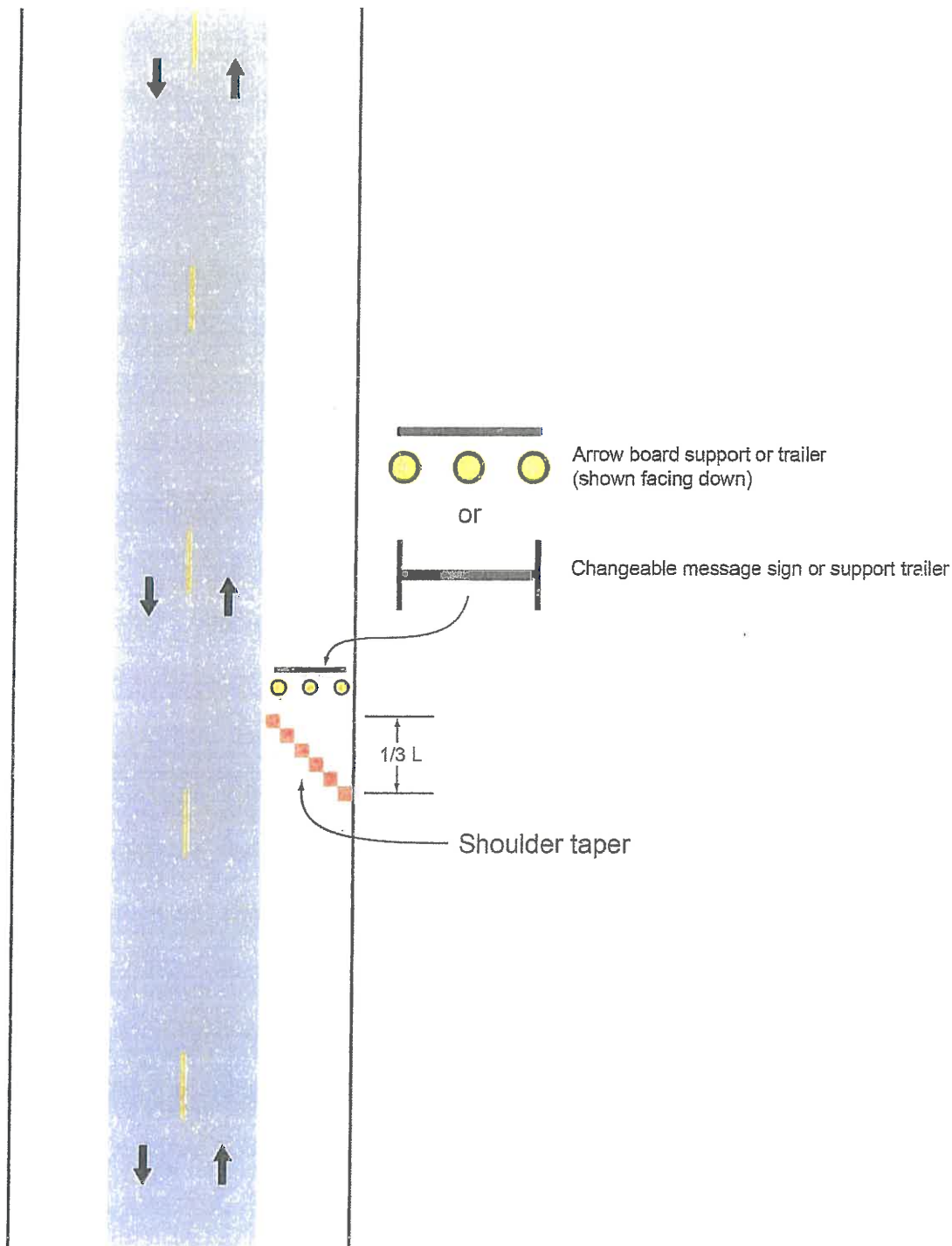


Table 6F-1. Temporary Traffic Control Zone Sign and Plaque Sizes (Sheet 1 of 3)

Sign or Plaque	Sign Designation	Section	Conventional Road	Freeway or Expressway	Minimum
Stop	R1-1	6F.06	30 x 30*	—	—
Stop (on Stop/Slow Paddle)	R1-1	6E.03	18 x 18	—	—
Yield	R1-2	6F.06	36 x 36 x 36*	—	30 x 30 x 30
To Oncoming Traffic (plaque)	R1-2aP	6F.06	36 x 30	48 x 36	24 x 18
Wait on Stop	R1-7	6E.05	24 x 30	24 x 30	—
Go on Slow	R1-8	6E.05	24 x 30	24 x 30	—
Speed Limit	R2-1	6F.12	24 x 30*	36 x 48	—
Fines Higher (plaque)	R2-3P	6F.12	24 x 18	36 x 24	—
Fines Double (plaque)	R2-6aP	6F.12	24 x 18	36 x 24	—
\$XX Fine (plaque)	R2-6bP	6F.12	24 x 18	36 x 24	—
Begin ^{Double} Fines Zone	R2-10	6F.12	24 x 30	36 x 48	—
End ^{Double} Fines Zone	R2-11	6F.12	24 x 30	36 x 48	—
End Work Zone Speed Limit	R2-12	6F.12	24 x 36	36 x 54	—
Movement Prohibition	R3-1,2,3,4,18,27	6F.06	24 x 24*	36 x 36	—
Mandatory Movement (1 lane)	R3-5	6F.06	30 x 36	—	—
Optional Movement (1 lane)	R3-6	6F.06	30 x 36	—	—
Mandatory Movement (text)	R3-7	6F.06	30 x 30*	—	—
Advance Intersection Lane Control	R3-8	6F.06	Varies x 30	—	—
Do Not Pass	R4-1	6F.06	24 x 30	36 x 48	—
Pass With Care	R4-2	6F.06	24 x 30	36 x 48	—
Keep Right	R4-7	6F.06	24 x 30	36 x 48	—
Narrow Keep Right	R4-7c	6F.06	18 x 30	—	—
Stay in Lane	R4-9	6F.11	24 x 30	36 x 48	—
Do Not Enter	R5-1	6F.06	30 x 30*	36 x 36	—
Wrong Way	R5-1a	6F.06	36 x 24*	42 x 30	—
One Way	R6-1	6F.06	36 x 12*	54 x 18	—
One Way	R6-2	6F.06	24 x 30*	36 x 48	—
No Parking (symbol)	R9-3	6F.06	24 x 24	36 x 36	—
Pedestrian Crosswalk	R9-8	6F.13	36 x 18	—	—
Sidewalk Closed	R9-9	6F.14	24 x 12	—	—
Sidewalk Closed, Use Other Side	R9-10	6F.14	24 x 12	—	—
Sidewalk Closed Ahead, Cross Here	R9-11	6F.14	24 x 18	—	—
Sidewalk Closed, Cross Here	R9-11a	6F.14	24 x 12	—	—
Road Closed	R11-2	6F.08	48 x 30	—	—
Road Closed - Local Traffic Only	R11-3a, 3b, 4	6F.09	60 x 30	—	—
Weight Limit	R12-1,2	6F.10	24 x 30	36 x 48	—
Weight Limit (with symbols)	R12-5	6F.10	24 x 36	36 x 48	—
Turn and Curve Signs	W1-1,2,3,4	6F.16	36 x 36	48 x 48	30 x 30
Reverse Curve (3 or more lanes)	W1-4b	6F.16	36 x 36	48 x 48	30 x 30
One-Direction Large Arrow	W1-6	6F.16	48 x 24	60 x 30	—
Chevron	W1-8	6F.16	18 x 24	30 x 36	—
Stop Ahead	W3-1	6F.16	36 x 36	48 x 48	30 x 30
Yield Ahead	W3-2	6F.16	36 x 36	48 x 48	30 x 30
Signal Ahead	W3-3	6F.16	36 x 36	48 x 48	30 x 30
Be Prepared to Stop	W3-4	6F.16	36 x 36	48 x 48	30 x 30
Reduced Speed Limit Ahead	W3-5	6F.16	36 x 36	48 x 48	30 x 30

(Also see C2(CA) Sign Size)

(See W1-4 Sign Size)

Table 6F-1. Temporary Traffic Control Zone Sign and Plaque Sizes (Sheet 2 of 5)

Sign or Plaque	Sign Designation	Section	Conventional Road	Freeway or Expressway	Minimum
XX MPH Speed Zone Ahead	W3-5a	6F.16	36 x 36	48 x 48	30 x 30
Merging Traffic	W4-1,5	6F.16	36 x 36	48 x 48	36 x 36
Lane Ends	W4-2	6F.24	36 x 36	48 x 48	30 x 30
Added Lane	W4-3,6	6F.16	36 x 36	48 x 48	30 x 30
No Merge Area (plaque)	W4-5P	6F.16	18 x 24	24 x 30	—
Road Narrows	W5-1	6F.16	36 x 36	48 x 48	30 x 30
Narrow Bridge	W5-2	6F.16	36 x 36	48 x 48	30 x 30
One Lane Bridge	W5-3	6F.16	36 x 36	48 x 48	30 x 30
Ramp Narrows	W5-4	6F.25	36 x 36	48 x 48	30 x 30
Divided Highway	W6-1	6F.16	36 x 36	48 x 48	50 x 30
Divided Highway Ends	W6-2	6F.16	36 x 36	48 x 48	30 x 30
Two-Way Traffic	W6-3	6F.32	36 x 36	48 x 48	30 x 30
Two-Way Traffic	W6-4	6F.76	12 x 18	12 x 18	—
Hill (symbol)	W7-1	6F.16	36 x 36	48 x 48	30 x 30
Next XX Miles (plaque)	W7-3aP	6F.53	24 x 18	36 x 30	—
Bump	W8-1	6F.16	36 x 36	48 x 48	30 x 30
Dip	W8-2	6F.16	36 x 36	48 x 48	30 x 30
Pavement Ends	W8-3	6F.16	36 x 36	48 x 48	30 x 30
Soft Shoulder	W8-4	6F.44	36 x 36	48 x 48	30 x 30
Slippery When Wet	W8-5	6F.16	36 x 36	48 x 48	30 x 30
Truck Crossing	W8-6	6F.36	36 x 36	48 x 48	30 x 30
Loose Gravel	W8-7	6F.16	36 x 36	48 x 48	30 x 30
Rough Road	W8-8	6F.16	36 x 36	48 x 48	30 x 30
Low Shoulder	W8-9	6F.44	36 x 36	48 x 48	30 x 30
Uneven Lanes	W8-11	6F.45	36 x 36	48 x 48	30 x 30
No Center Line	W8-12	6F.47	36 x 36	48 x 48	30 x 30
Fallen Rocks	W8-14	6F.16	36 x 36	48 x 48	30 x 30
Grooved Pavement	W8-15	6F.16	36 x 36	48 x 48	30 x 30
Motorcycle (plaque)	W8-15P	6F.54	24 x 18	30 x 24	—
Shoulder Drop Off (symbol)	W8-17	6F.44	36 x 36	48 x 48	30 x 30
Shoulder Drop-Off (plaque)	W8-17P	6F.44	24 x 18	30 x 24	—
Road May Flood	W8-18	6F.16	36 x 36	48 x 48	24 x 24
No Shoulder	W8-23	6F.16	36 x 36	48 x 48	30 x 30
Steel Plate Ahead	W8-24	6F.46	36 x 36	48 x 48	30 x 30
Shoulder Ends	W8-25	6F.16	36 x 36	48 x 48	30 x 30
Lane Ends	W9-1,2	6F.16	36 x 36	48 x 48	30 x 30
Center Lane Closed Ahead	W9-3	6F.23	36 x 36	48 x 48	30 x 30
Grade Crossing Advance Warning	W10-1	6F.16	36 dia.	—	—
Truck	W11-10	6F.36	36 x 36	48 x 48	30 x 30
Double Arrow	W12-1	6F.16	30 x 30	—	—
Low Clearance	W12-2	6F.16	36 x 36	48 x 48	30 x 30
Advisory Speed (plaque)	W13-1P	6F.52	24 x 24	30 x 30	18 x 18
On Ramp (plaque)	W13-1P	6F.25	36 x 36	36 x 36	—
No Passing Zone (pennant)	W14-3	6F.16	48 x 48 x 36	64 x 64 x 48	40 x 40 x 30
XX Feet (plaque)	W16-2P	6F.16	24 x 18	30 x 24	—
Road Work (with distance)	W20-1	6F.18	36 x 36	48 x 48	30 x 30

(See W5-1 or C12(CA) Sign Sizes)

(See W50-1(CA) Sign)

(See C23(CA) for RAMP WORK AHEAD Sign)

Table 6F-1. Temporary Traffic Control Zone Sign and Plaque Sizes (Sheet 3 of 3)

Sign or Plaque	Sign Designation	Section	Conventional Road	Freeway or Expressway	Minimum
Detour (with distance)	W20-2	6F.19	36 x 36	48 x 48	30 x 30
Road (Street) Closed (with distance)	W20-3	6F.20	36 x 36	48 x 48	30 x 30
One Lane Road (with distance)	W20-4	6F.21	36 x 36	48 x 48	30 x 30
Lane(s) Closed (with distance)	W20-5,5a	6F.22	36 x 36	48 x 48	30 x 30
Flagger (with distance)	W20-6	6F.23	36 x 36	48 x 48	30 x 30
Flagger	W20-7a	6F.31	36 x 36	48 x 48	30 x 30
Slow (on Stop/Slow Paddle)	W20-8	6E.03	18 x 18	—	—
Workers	W21-1,1a	6F.33	36 x 36	48 x 48	30 x 30
Fresh Oil (Tar)	W21-2	6F.34	36 x 36	48 x 48	30 x 30
Road Machinery Ahead	W21-3	6F.35	36 x 36	48 x 48	30 x 30
Slow Moving Vehicle	W21-4	6G.06	36 x 18	—	—
Shoulder Work	W21-5	6F.37	36 x 36	48 x 48	30 x 30
Shoulder Closed	W21-5a	6F.37	36 x 36	48 x 48	30 x 30
Shoulder Closed (with distance)	W21-5b	6F.37	36 x 36	48 x 48	30 x 30
Survey Crew	W21-6	6F.38	36 x 36	48 x 48	30 x 30
Utility Work Ahead	W21-7	6F.39	36 x 36	48 x 48	30 x 30
Mowing Ahead	W21-8	6G.06	36 x 36	48 x 48	30 x 30
Blasting Zone Ahead	W22-1	6F.41	36 x 36	48 x 48	30 x 30
Turn Off 2-Way Radio and Cell Phone	W22-2	6F.42	42 x 36	42 x 36	—
End Blasting Zone	W22-3	6F.43	42 x 36	42 x 36	36 x 30
Slow Traffic Ahead	W23-1	6F.27	54 x 30 48 x 24	72 x 42 48 x 24	48 x 24
New Traffic Pattern Ahead	W23-2	6F.30	36 x 36	48 x 48	30 x 30
Double Reverse Curve (1 lane)	W24-1	6F.49	36 x 36	48 x 48	30 x 30
Double Reverse Curve (2 lanes)	W24-1a	6F.49	36 x 36	48 x 48	30 x 30
Double Reverse Curve (3 lanes)	W24-1b	6F.49	36 x 36	48 x 48	30 x 30
All Lanes	W24-1cP	6F.49	24 x 24 18	30 x 30 24	—
Road Work (Construction) Next XX Miles	G20-1	6F.56	60 x 36 48 x 24	90 x 48 48 x 24	36 x 18
End Road Work	G20-2	6F.57	36 x 18	48 x 24	—
Pilot Car Follow Me	G20-4	6F.58	36 x 18	—	—
Work Zone (plaque)	G20-5aP	6F.12	24 x 18	36 x 24	—
Exit Open	E5-2	6F.28	48 x 36	48 x 36	—
Exit Closed	E5-2a	6F.28	48 x 36	48 x 36	—
Exit Only	E5-3	6F.29	48 x 36	48 x 36	—
Detour	M4-8	6F.59	24 x 12	30 x 15	—
End Detour	M4-8a	6F.59	24 x 18	24 x 18	—
End	M4-8b	6F.59	24 x 12	24 x 12	—
Detour	M4-9	6F.59	30 x 24	48 x 36	—
Bike/Pedestrian Detour	M4-9a	6F.59	30 x 24	—	—
Pedestrian Detour	M4-9b	6F.59	30 x 24	—	—
Bike Detour	M4-9c	6F.59	30 x 24	—	—
Detour	M4-10	6F.59	48 x 18	—	—

(See C19(CA) for RAMP CLOSED Sign)
 (Also See C20(CA) Sign Size)
 (Also See C9A(CA) Sign Size)
 (See W24-1 Sign Size)
 (See W24-1 Sign Size)

* See Table 2B-1 for minimum size required for signs facing traffic on multi-lane conventional roads

Notes: 1. Larger signs may be used wherever necessary for greater legibility or emphasis
 2. Dimensions are shown in inches and are shown as width x height

Table 6F-1(CA). California Temporary Traffic Control Zone Sign and Plaque Sizes

Sign or Plaque	Sign Designation	Section	Conventional Road (Minimum)	Expressway	Freeway	Overpass
RAMP CLOSED	C2(CA)	6F.28	48 x 30	48 x 30	48 x 30	---
California Flagger Symbol	C9A(CA)	6F.31	36 x 36	48 x 48	48 x 48	---
NARROW LANE(S)	C12(CA)	6F.26, 6F.102(CA)	36 x 36	48 x 48	48 x 48	---
RAMP CLOSED AHEAD	C19(CA)	6F.28	36 x 36	48 x 48	48 x 48	---
RIGHT LANE CLOSED AHEAD	C20(CA)	6F.22	36 x 36	48 x 48	48 x 48	72 x 72
LEFT plaque	C20A(CA)	6F.22	16 x 7	19 x 8	19 x 8	33 x 10
Numeral plaque	C20B(CA)	6F.22	6 x 8	8 x 10	8 x 10	10 x 12
RAMP WORK AHEAD	C23(CA)	6F.18	36 x 36	48 x 48	48 x 48	---
ROAD (STREET) WORK Informational plaque	C23B(CA)	6F.18	Var x 18	Var x 24	Var x 24	---
SHOULDER WORK AHEAD	C24(CA)	6F.37	30 x 30	48 x 48	48 x 48	---
OPEN TRENCH	C27(CA)	6F.103(CA)	36 x 36	48 x 48	48 x 48	---
STOP Paddle (not assigned)	C28A(CA)	6E.03, 6E.07, 7D.03, 7D.05	18 x 18	18 x 18	---	24 x 24
SLOW Paddle (not assigned)	C28B(CA)	6E.03, 6E.07	18 x 18	18 x 18	---	24 x 24
XXXX FT	C29(CA)	6F.53	20 x 7	36 x 9	36 x 9	---
LANE CLOSED	C30(CA)	6F.22	30 x 30	48 x 48	48 x 48	---
SHOULDER CLOSED	C30A(CA)	6F.37	30 x 30	48 x 48	48 x 48	---
NO SHOULDER	C31A(CA)	6F.44, 6F.103(CA)	36 x 36	48 x 48	48 x 48	---
TRAFFIC CONTROL - WAIT AND FOLLOW PILOT CAR	C37(CA)	6F.58	36 x 42	36 x 42	---	---
USE NEXT EXIT	C38(CA)	6F.28	---	48 x 36	48 x 36	---
TRAFFIC FINES DOUBLED IN CONSTRUCTION ZONES	C40(CA)	6F.12	108 x 42	144 x 60	144 x 60	---
TRAFFIC FINES DOUBLED IN WORK ZONES	C40A(CA)	6F.12	36 x 36	48 x 48	48 x 48	---
FRESH CONCRETE	C43(CA)	6F.107(CA)	36 x 36	48 x 48	48 x 48	---
TRUCKS ENTERING EXITING	C44(CA)	6F.36	36 x 36	48 x 48	48 x 48	---
RUMBLE STRIPS	C45(CA)	6F.87	36 x 36	48 x 48	---	---
UNEVEN PAVEMENT	C46(CA)	6F.45	36 x 36	48 x 48	48 x 48	---
UNEVEN PAVEMENT plaque	C46P(CA)	6F.45	30 x 18	36 x 24	36 x 24	---
MOVE OVER OR SLOW WHEN AMBER LIGHTS FLASHING	R111(CA)	6F.108(CA)	54 x 18	54 x 18	54 x 18	---
PILOT CAR DO NOT PASS	R115(CA)	6F.58	36 x 18	36 x 18	---	---
DETOUR with Arrow	SC3(CA)	6F.59	36 x 12	48 x 18	48 x 18	---
SPECIAL EVENT AHEAD	SC5(CA)	6F.18	36 x 36	48 x 48	48 x 48	---
RAMP CLOSED (Not more than one day)	SC6-3(CA)	6F.28	48 x 48	48 x 48	48 x 48	---
RAMP CLOSED (More than one day)	SC6-4(CA)	6F.28	48 x 60	48 x 60	48 x 60	---
Day/Month plaque	SC6A(CA)	6F.28	12 x 6	12 x 6	12 x 6	---
Time plaque	SC6B(CA)	6F.28	6 x 6	6 x 6	6 x 6	---
RAMP CLOSED, USE RAMP AT _____	SC7(CA)	6F.28	84 x 42	84 x 42	84 x 42	---
_____ EXIT - RAMP CLOSED	SC8(CA)	6F.28	---	84 x 42	84 x 42	---
(FWY) DETOUR with Arrow	SC9(CA)	6F.59	36 x 36	48 x 48	48 x 48	---
LANE CLOSED AHEAD or ROAD WORK AHEAD	SC10(CA)	6F.104(CA)	48 x 30	66 x 36	66 x 36	---
LANE CLOSED	SC11(CA)	6F.104(CA)	42 x 30	54 x 42	54 x 42	---
DO NOT PASS	SC13(CA)	6F.104(CA)	42 x 30	54 x 42	54 x 42	---
CAUTION	SC15(CA)	6F.104(CA)	42 x 18	54 x 24	54 x 24	---
EXIT with Arrow	SC18(CA)	6F.28	---	48 x 48	48 x 48	---
Slow For The Cone Zone	SC19(CA)	6F.106(CA)	54 x 36	54 x 36	54 x 36	114 x 78
SLOW FOR THE CONE ZONE	SC20(CA)	6F.106(CA)	42 x 36	54 x 48	54 x 48	---
CAUTION FREQUENT STOPPING AND BACKING STAY BACK 100 FEET	SC21(CA)	6F.108(CA)	30 x 42	30 x 42	30 x 42	---
FLOODING AHEAD TURN AROUND DON'T DROWN	W86(CA)	6I.101(CA)	30 x 24	---	---	---

Table 6F-101(CA). Maximum Spacing of Channelizing Devices

Speed (mph)	Maximum Channelizing Devices Spacing		
	* Taper* (feet)	Tangent (feet)	Conflict** (feet)
20	20	40	10
25	25	50	12
30	30	60	15
35	35	70	17
40	40	80	20
45	45	90	22
50	50	100	25
55	50	100	25
60	50	100	25
65	50	100	25
70	50	100	25
75	50	100	25

* Maximum channelizing device spacing for all speeds on one-lane/two-way tapers is 20 feet.

Maximum channelizing device spacing for all speeds on downstream tapers is 20 feet.

All other tapers are as shown.

** Use on intermediate and short-term projects for taper and tangent sections where there are no pavement markings or where there is a conflict between existing pavement markings and channelizing devices.

CHAPTER 6H. TYPICAL APPLICATIONS

Section 6H.01 Typical Applications

Support:

01 Chapter 6G contains discussions of typical TTC activities. This Chapter presents typical applications for a variety of situations commonly encountered. While not every situation is addressed, the information illustrated can generally be adapted to a broad range of conditions. In many instances, an appropriate TTC plan is achieved by combining features from various typical applications. For example, work at an intersection might present a near-side work zone for one street and a far-side work zone for the other street. These treatments are found in two different typical applications, while a third typical application shows how to handle pedestrian crosswalk closures. For convenience in using the typical application diagrams, Tables 6C-1 and 6C-4 are reproduced in this Chapter as Tables 6H-3 and 6H-4, respectively.

02 Procedures for establishing TTC zones vary with such conditions as road configuration, location of the work, work activity, duration of work, road user volumes, road vehicle mix (buses, trucks, cars, motorcycles, and bicycles), and road user speeds.

03 In general, the procedures illustrated represent minimum solutions for the situations depicted. Except for the notes (which are clearly classified using headings as being Standard, Guidance, Option, or Support), the information presented in the typical applications can generally be regarded as Guidance.

Option:

04 Other devices may be added to supplement the devices and device spacing may be adjusted to provide additional reaction time or delineation. Fewer devices may be used based on field conditions.

Support:

05 Figures and tables found throughout Part 6 provide information for the development of TTC plans. Also, Table 6H-3 is used for the determination of sign spacing and other dimensions for various area and roadway types.

06 Table 6H-1 is an index of the 46 typical applications. Typical applications are shown on the right-hand page with notes on the facing page to the left. The legend for the symbols used in the typical applications is provided in Table 6H-2. In many of the typical applications, sign spacings and other dimensions are indicated by letters using the criteria provided in Table 6H-3. The formulas for determining taper lengths are provided in Table 6H-4.

07 Most of the typical applications show TTC devices for only one direction.

Guidance:

08 *The spacing of channelizing devices should not exceed the maximum distances shown in Table 6F-101(CA).*

Notes for Figure 6H-4 — Typical Application 4 Short Duration or Mobile Operation on a Shoulder

Guidance:

1. *In those situations where multiple work locations within a limited distance make it practical to place stationary signs, the distance between the advance warning sign and the work should not exceed 5 miles.*
2. *In those situations where the distance between the advance signs and the work is 2 miles to 5 miles, a Supplemental Distance plaque should be used with the ROAD WORK AHEAD sign or SHOULDER WORK AHEAD (C24(CA)) sign.*

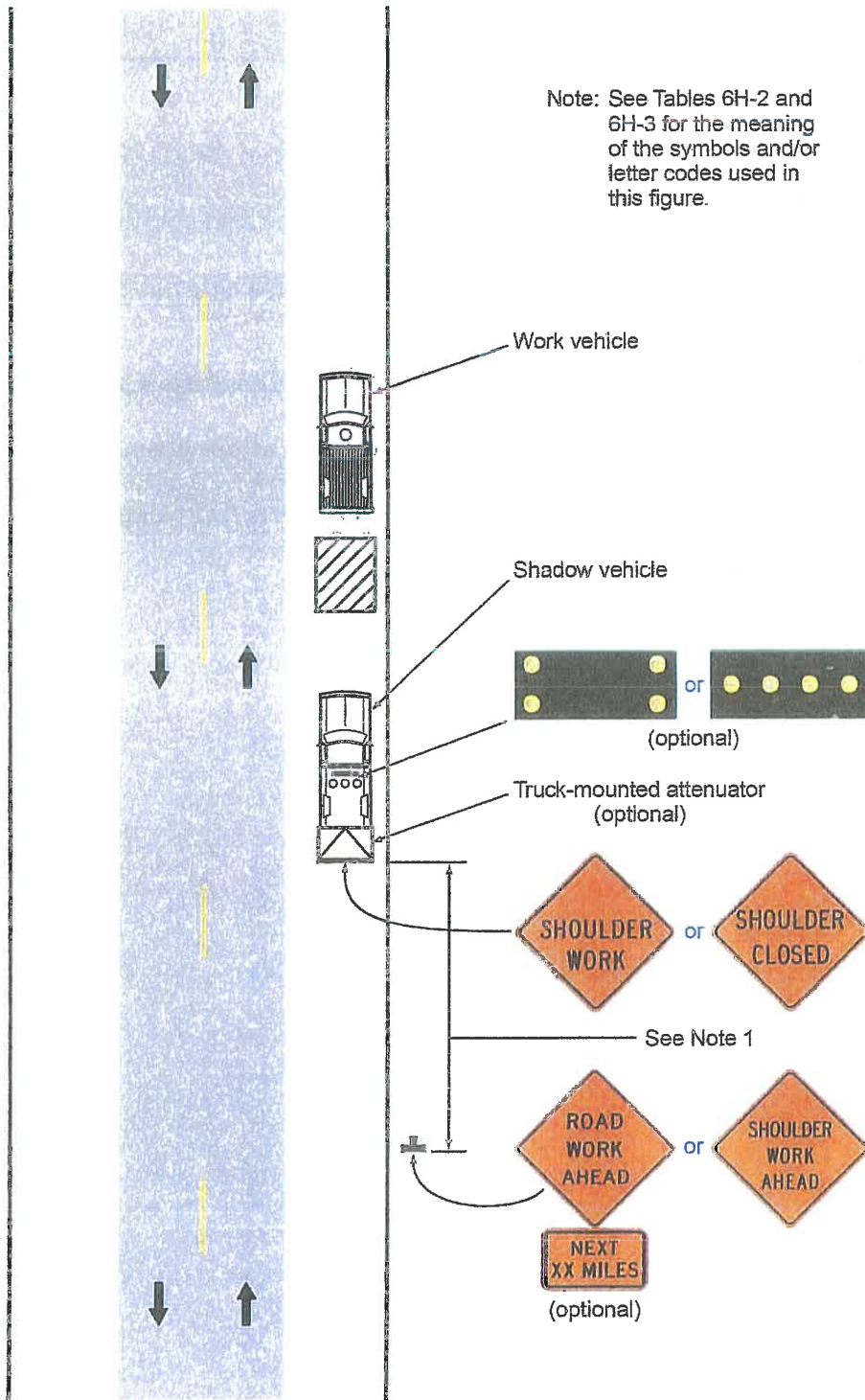
Option:

3. The ROAD WORK NEXT XX MILES sign may be used instead of the ROAD WORK AHEAD sign or SHOULDER WORK AHEAD (C24(CA)) sign if the work locations occur over a distance of more than 2 miles.
4. Stationary warning signs may be omitted for short duration or mobile operations if the work vehicle displays high-intensity rotating, flashing, oscillating, or strobe lights.
5. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing, oscillating, or strobe lights.

Standard:

6. **Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights.**
7. **If an arrow board is used for an operation on the shoulder, the caution mode shall be used.**
8. **Vehicle-mounted signs shall be mounted in a manner such that they are not obscured by equipment or supplies. Sign legends on vehicle-mounted signs shall be covered or turned from view when work is not in progress.**

Figure 6H-4. Short-Duration or Mobile Operation on a Shoulder (TA-4)



Typical Application 4

Notes for Figure 6H-10 6H-10(CA) and 6H-10A(CA) — Typical Application 10 Lane Closure on a Two-Lane Road Using Flaggers

Option:

1. For low-volume (Refer to Part 5, Section 5A.01) situations with short work zones on straight roadways where the flagger is visible to road users approaching from both directions, a single flagger, positioned to be visible to road users approaching from both directions, may be used (see Chapter 6E).
2. The ROAD WORK AHEAD and the END ROAD WORK signs may be omitted for short-duration operations.
3. Flashing warning lights and/or flags may be used to call attention to the advance warning signs. A BE PREPARED TO STOP sign may be added to the sign series.

Guidance:

4. *The buffer space should be extended so that the two-way traffic taper is placed before a horizontal (or crest vertical) curve to provide adequate sight distance for the flagger and a queue of stopped vehicles.*

Standard:

5. **At night, flagger stations shall be illuminated, except in emergencies.**

Guidance:

6. *When used, the BE PREPARED TO STOP sign should be located between ~~between~~ after the Flagger sign and the ONE LANE ROAD sign.*
7. *When a grade crossing exists within or upstream of the transition area and it is anticipated that queues resulting from the lane closure might extend through the grade crossing, the TTC zone should be extended so that the transition area precedes the grade crossing.*
8. *When a grade crossing equipped with active warning devices exists within the activity area, provisions should be made for keeping flaggers informed as to the activation status of these warning devices.*
9. *When a grade crossing exists within the activity area, drivers operating on the left-hand side of the normal center line should be provided with comparable warning devices as for drivers operating on the right-hand side of the normal center line.*
10. *Early coordination with the railroad company or light rail transit agency should occur before work starts.*

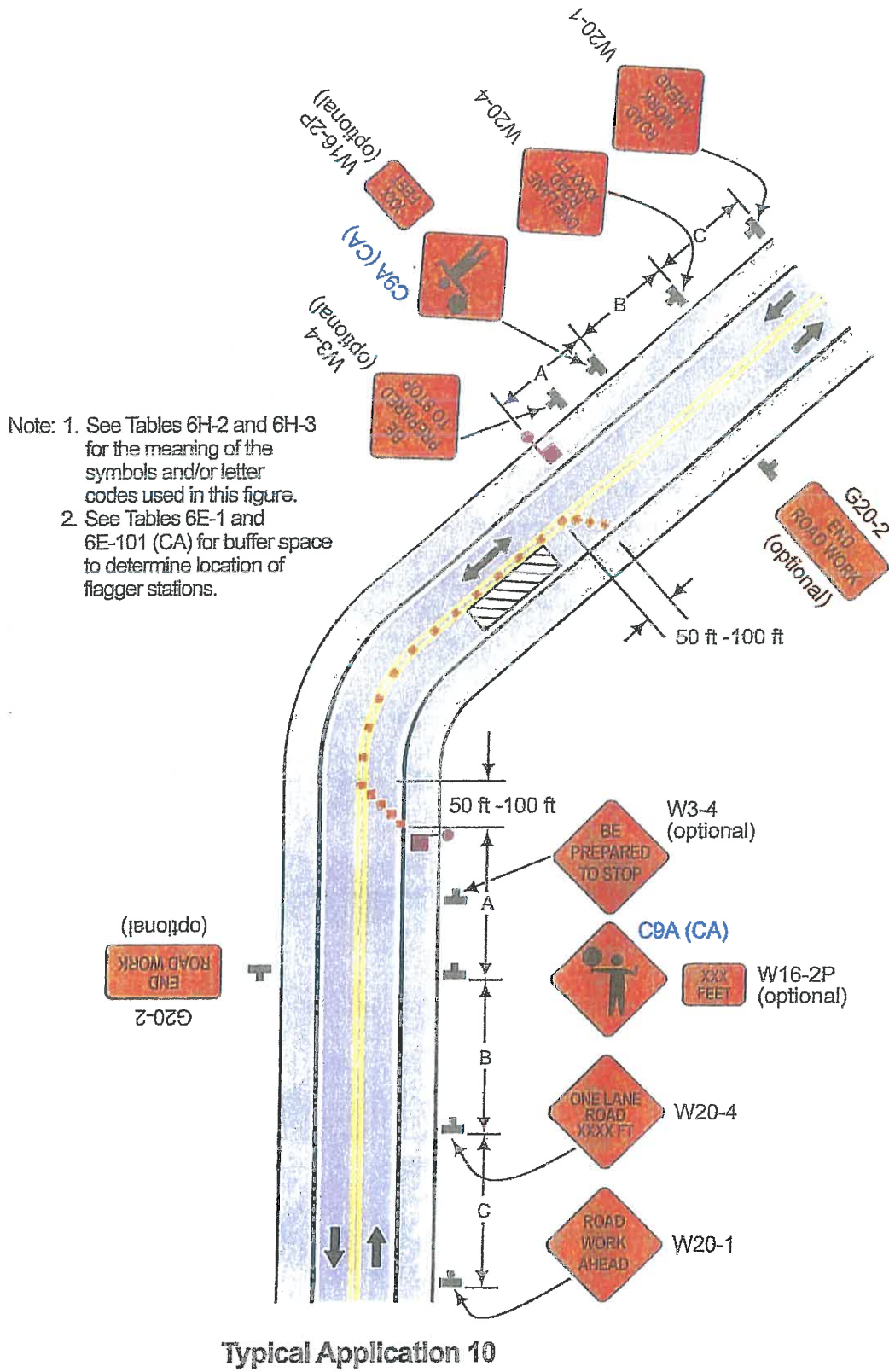
Option:

11. A flagger or a uniformed law enforcement officer may be used at the grade crossing to minimize the probability that vehicles are stopped within 15 feet of the grade crossing, measured from both sides of the outside rails.

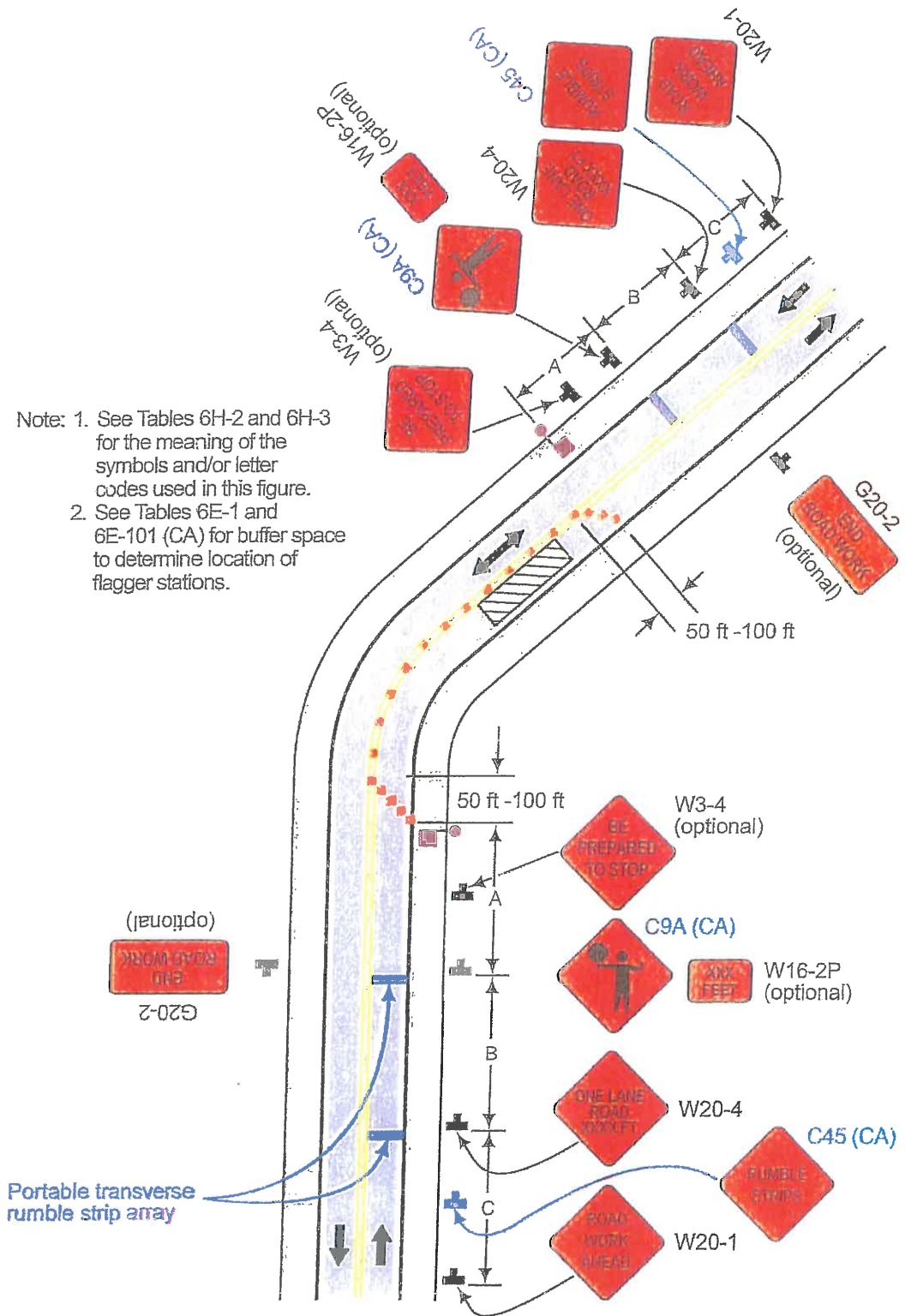
Support:

12. *For State highways, see Caltrans' Standard Plan T13. See Section 1A.11 for information regarding this publication.*
13. *If portable transverse rumble strips are used for flagging operations, refer to Section 6F.87.*

Figure 6H-10 (CA). Lane Closure on Two-Lane Road Using Flaggers (TA-10)



**Figure 6H-10A (CA). Lane Closure on Two-Lane Road Using Flaggers (TA-10A)
 Using Portable Transverse Rumble Strips**



Note: 1. See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.
 2. See Tables 6E-1 and 6E-101 (CA) for buffer space to determine location of flagger stations.

Typical Application 10A

Notes for Figure 6H-17—Typical Application 17 Mobile Operations on a Two-Lane Road

Standard:

1. **Vehicle-mounted signs shall be mounted in a manner such that they are not obscured by equipment or supplies. Sign legends on vehicle-mounted signs shall be covered or turned from view when work is not in progress.**
2. **Shadow and work vehicles shall display high-intensity rotating, flashing, oscillating, or strobe lights.**
3. **If an arrow board is used, it shall be used in the caution mode.**

Guidance:

4. *Where practical and when needed, the work and shadow vehicles should pull over periodically to allow vehicular traffic to pass.*
5. *Whenever adequate stopping sight distance exists to the rear, the shadow vehicle should maintain the minimum distance from the work vehicle and proceed at the same speed. The shadow vehicle should slow down in advance of vertical or horizontal curves that restrict sight distance.*
6. *The shadow vehicles should also be equipped with two high-intensity flashing lights mounted on the rear, adjacent to the sign.*

Option:

7. The distance between the work and shadow vehicles may vary according to terrain, paint drying time, and other factors.
8. Additional shadow vehicles to warn and reduce the speed of oncoming or opposing vehicular traffic may be used. Law enforcement vehicles may be used for this purpose.
9. A truck-mounted attenuator may be used on the shadow vehicle or on the work vehicle.
10. If the work and shadow vehicles cannot pull over to allow vehicular traffic to pass frequently, a DO NOT PASS sign may be placed on the rear of the vehicle blocking the lane.

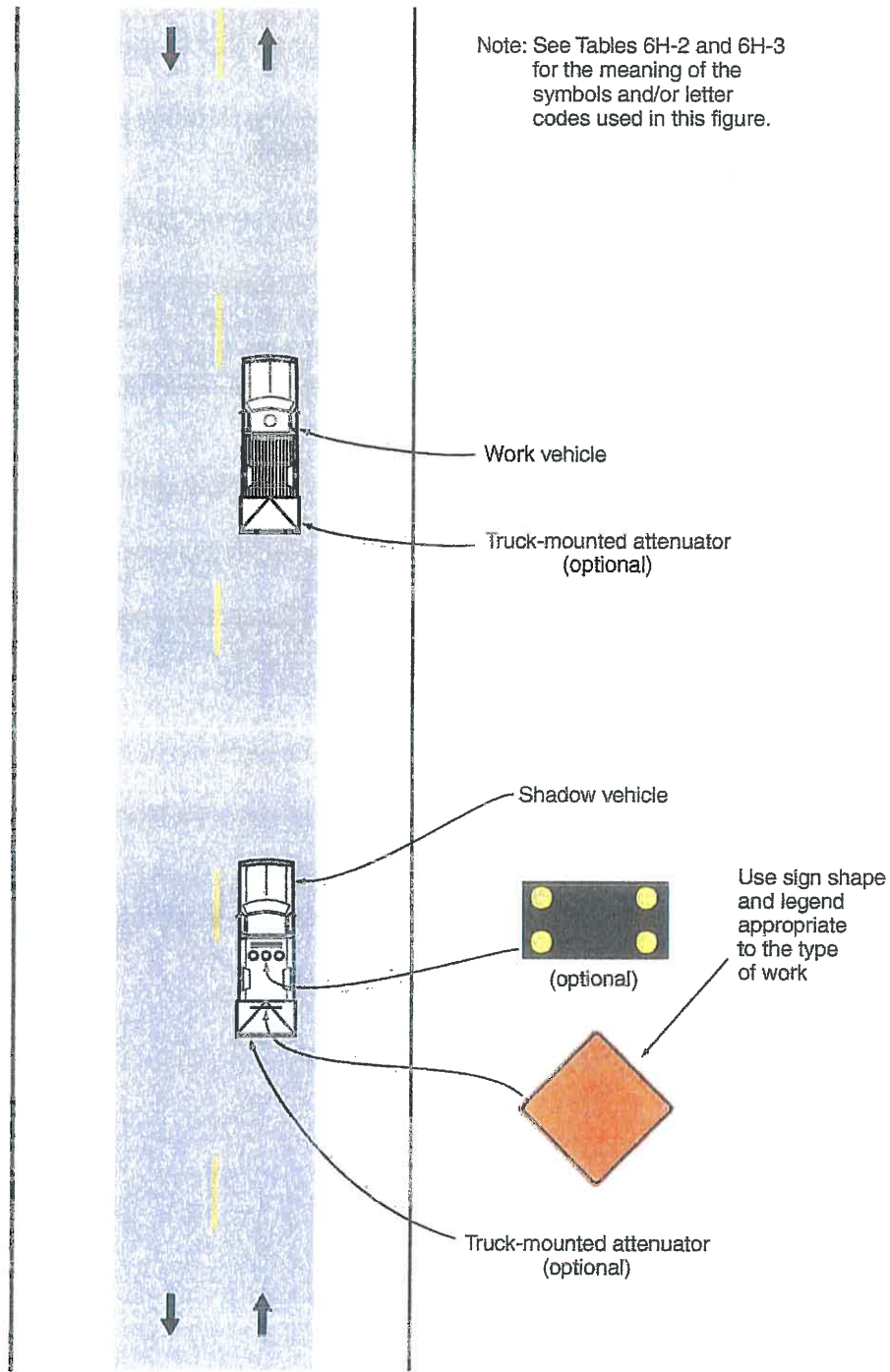
Support:

11. Shadow vehicles are used to warn motor vehicle traffic of the operation ahead.

Standard:

12. **Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights.**
13. *This typical application shall not be used on State highways, Caltrans' Standard Plan T17 for moving lane closure shall be used instead. See Section 1A.11 for information regarding this publication.*

Figure 6H-17. Mobile Operations on a Two-Lane Road (TA-17)



Typical Application 17

Notes for Figure 6H-34—Typical Application 34 Lane Closure with a Temporary Traffic Barrier

Standard:

1. **This information also shall be used when work is being performed in the lane adjacent to the median on a divided highway. In this case, the LEFT LANE CLOSED signs and the corresponding Lane Ends signs shall be substituted.**

Guidance:

2. *For long-term lane closures on facilities with permanent edge lines, a temporary edge line should be installed from the upstream end of the merging taper to the downstream end of the downstream taper, and conflicting pavement markings should be removed.*
3. *The use of a barrier should be based on engineering judgment.*

Standard:

4. **Temporary traffic barriers, if used, shall comply with the provisions of Section 6F.85.**
5. **The barrier shall not be placed along the merging taper. The lane shall first be closed using channelizing devices and pavement markings.**

Option:

6. *Type C Steady-Burn warning lights may be placed on channelizing devices and the barrier parallel to the edge of pavement for nighttime lane closures.*
7. *The barrier shown in this typical application is an example of one method that may be used to close a lane for a long-term project. If the work activity permits, a movable barrier may be used and relocated to the shoulder during non-work periods or peak-period vehicular traffic conditions, as appropriate.*

Standard:

8. **If a movable barrier is used, the temporary white edge line shown in the typical application shall not be used. During the period when the right-hand lane is opened, the sign legends and the channelization shall be changed to indicate that only the shoulder is closed, as illustrated in Figure 6H-5 6H-5(CA). The arrow board, if used, shall be placed at the downstream end of the shoulder taper and shall display the caution mode.**

Guidance:

9. *If a movable barrier is used, the shift should be performed in the following manner. When closing the lane, the lane should be initially closed with channelizing devices placed along a merging taper using the same information employed for a stationary lane closure. The lane closure should then be extended with the movable-barrier transfer vehicle moving with vehicular traffic. When opening the lane, the movable barrier transfer vehicle should travel against vehicular traffic from the termination area to the transition area. The merging taper should then be removed using the same information employed for a stationary lane closure.*

Figure 6H-34. Lane Closure with a Temporary Traffic Barrier (TA-34)

