

**California**  
**Manual on Uniform**  
**Traffic Control Devices**  
for Streets and Highways  
(FHWA's MUTCD 2003 Edition,  
as amended for use in California)

**Temporary Traffic Control**



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

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# California Manual on Uniform Traffic Control Devices

for Streets and Highways

(FHWA's MUTCD 2003 Edition,  
as amended for use in California)



STATE OF CALIFORNIA  
BUSINESS, TRANSPORTATION AND HOUSING AGENCY  
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**California**  
**Manual on Uniform**  
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(FHWA's MUTCD 2003 Edition,  
as amended for use in California)

Issued by:



DIVISION OF TRAFFIC OPERATIONS

**September 26, 2006**

ARNOLD SCHWARZENEGGER  
Governor

SUNNE WRIGHT McPEAK  
Secretary, Business, Transportation and Housing Agency

WILL KEMPTON  
Director, Department of Transportation

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The Manual on Uniform Traffic Control Devices (MUTCD) is approved by the Federal Highway Administrator as the National Standard in accordance with Title 23 U.S. Code, Sections 109(d), 114(a), 217, 315, and 402(a), 23 CFR 655, and 49 CFR 1.48(b)(8), 1.48(b)(33), and 1.48(c)(2).

The California Manual on Uniform Traffic Control Devices (California MUTCD) is published by the State of California, Department of Transportation and is issued to adopt uniform standards and specifications for all official traffic control devices, in accordance with Section 21400 of the California Vehicle Code.

This manual is current as of the date of publication on the cover. However, it may be necessary from time to time to modify, change or adopt new standards and specifications for traffic control devices and/or issue errata or editorial changes to the manual. To ensure that the traffic control device practitioner is accessing the most current information regarding traffic control device topics for California, the practitioner is advised to always reference the California MUTCD web site.

The California MUTCD, California Sign Specifications and other publications and related current information is available on the Internet at the following web link:

<http://www.dot.ca.gov/hq/traffops/signtech/mutcdsupp/>

Addresses for Publications Referenced in the ~~MUTCD~~ California MUTCD

American Association of State Highway and Transportation Officials (AASHTO)  
444 North Capitol Street, NW, Suite 249  
Washington, DC 20001  
[www.transportation.org](http://www.transportation.org)

American Railway Engineering and Maintenance-of-Way Association (AREMA)  
8201 Corporate Drive, Suite 1125  
Landover, MD 20785-2230  
[www.arena.org](http://www.arena.org)

California Building Standards Code  
International Conference of Building Officials  
5360 South Workman Mill Road  
Whittier, CA 90601  
[www.icbo.org](http://www.icbo.org)

California Code Publications &  
California Law  
<http://www.leginfo.ca.gov/calaw.html>

California Department of Transportation Publications  
Publications Distribution Unit  
1900 Royal Oaks Drive  
Sacramento, CA 95815-3800  
<http://caltrans-opac.ca.gov/publicat.htm>

California Vehicle Code  
Department of Motor Vehicles  
Sacramento, California  
<http://www.dmv.ca.gov/pubs/pubs.htm>

Federal Highway Administration Report Center  
Facsimile number: 301.577.1421  
[report.center@fhwa.dot.gov](mailto:report.center@fhwa.dot.gov)

Illuminating Engineering Society (IES)  
120 Wall Street, Floor 17  
New York, NY 10005  
[www.iesna.org](http://www.iesna.org)

Institute of Makers of Explosives  
1120 19th Street, NW, Suite 310  
Washington, DC 20036-3605  
[www.ime.org](http://www.ime.org)

Institute of Transportation Engineers (ITE)  
1099 14th Street, NW, Suite 300 West  
Washington, DC 20005-3438  
[www.ite.org](http://www.ite.org)

International Organization for Standards  
c/o Mr. Gerard Kuso  
Austrian Standards Institute  
Heinestrasse 38  
Postfach 130  
A-1021  
Wien, Austria  
[www.iso.ch](http://www.iso.ch)

ISEA - The Safety Equipment Association  
1901 North Moore Street, Suite 808  
Arlington, VA 22209  
[www.safetysystem.org](http://www.safetysystem.org)

National Committee on Uniform Traffic Laws and Ordinances (NCUTLO)  
107 South West Street, Suite 110  
Alexandria, VA 22314  
[www.ncutlo.org](http://www.ncutlo.org)

Occupational Safety and Health Administration (OSHA)  
U.S. Department of Labor  
200 Constitution Avenue, NW  
Washington, DC 20210  
[www.osha.gov](http://www.osha.gov)

Transportation Research Board (TRB)  
The National Academies  
2101 Constitution Avenue, NW  
Washington, DC 20418  
[www.nas.edu/trb](http://www.nas.edu/trb)

U.S. Architectural and Transportation Barriers Compliance Board (The U.S. Access Board)  
1331 F Street, NW, Suite 1000  
Washington, DC 20004-1111  
[www.access-board.gov](http://www.access-board.gov)

### Acknowledgments

The Federal Highway Administration gratefully acknowledges the valuable assistance that it received from the National Committee on Uniform Traffic Control Devices and its over 200 voluntary members in the development of this Manual.

The Department of Transportation gratefully acknowledges the Federal Highway Administration's California Division, the California Traffic Control Devices Committee (CTCDC) members, staff from various cities and counties in California and the Department's headquarters and districts staff for providing guidance and direction in the development of this Manual. Information regarding the California portion (blue text and/or blue border line) of this Manual can be obtained by writing to:

State of California  
Department of Transportation,  
Chief, Division of Traffic Operations, MS-36  
1120 N Street, Sacramento, CA 95814.

NOTE: The contents of this publication are not copyrighted. They may be reprinted freely.

The California MUTCD is available on the Department of Transportation Web Page at  
<http://www.dot.ca.gov/hq/traffops/signtech/mutcdsupp/>.

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**DEPARTMENT OF TRANSPORTATION**

## DIVISION OF TRAFFIC OPERATIONS

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*Flex your power!  
Be energy efficient!*

September 26, 2006

Mr. Gene Fong, Division Administrator  
Federal Highway Administration  
650 Capitol Mall, Suite 4-100  
Sacramento, CA 95814

Attn: Matthew Schmitz, Safety/Traffic Engineer

Dear Mr. Fong:

Pursuant to the provisions of the California Vehicle Code Section 21400 and the recommendation of the California Traffic Control Devices Committee (CTCDC), the California Department of Transportation (Department) hereby adopts the California Manual on Uniform Traffic Control Devices (FHWA's MUTCD 2003 Revision 1, as amended for use in California), also called the California MUTCD, to prescribe uniform standards and specifications for all official traffic control devices in California.

This combined document, the California MUTCD incorporates FHWA's MUTCD 2003 Revision 1 dated November 20, 2004, and the MUTCD 2003 California Supplement dated May 20, 2004. It also incorporates all policies on traffic control devices issued by the California Department of Transportation that have been issued since May 20, 2004, and other editorial, errata and format changes that were necessary to update the previous documents.

The California MUTCD supersedes and replaces the previously adopted (on May 20, 2004) MUTCD 2003 Edition and the MUTCD 2003 California Supplement as well as Chapters 4, 5, 6, 8, 10, 11, 12, and the traffic signals portion of chapter 9 of the 1996 Caltrans Traffic Manual, as amended, and all previous editions thereof. It does not supersede the Department's Standard Plans, Standard Specifications or the Special Provisions publications.

The California MUTCD's draft versions were made available to the Department's district staff, local agencies and the general public for review and comment through two open public comment periods, which closed on November 14, 2005, and May 30, 2006. These public comment periods were followed by CTCDC workshops on November 16, 2005 and June 1, 2006, respectively. Resolutions and decisions reached, in these and other regular CTCDC meetings, since May 20, 2004 are reflected in the California MUTCD.

The California MUTCD uses the same format as the FHWA's MUTCD. It incorporates FHWA's MUTCD 2003 Edition Revision 1 in its entirety with cross-outs of all text portions that are not applicable in California. All MUTCD figures and tables that are not applicable in California are shown with blue X cross-outs.

The California text additions and enhancements are incorporated at appropriate locations and shown in blue color font with a blue margin line on the right to keep them distinct from MUTCD text.

For California topics where there is no corresponding section, figure or table in the MUTCD, the California MUTCD gives a number that begins with 101 for that section, figure or table and increases in sequence, followed with a "(CA)" to indicate that this is a California assigned section, figure or table number. The blue margin line on the right is also added to all California figures and tables to keep them distinct from the MUTCD figures and tables.

The MUTCD figures and tables that have been modified or added to, in the California MUTCD retain the same MUTCD Figure or Table number but include "(CA)" to indicate that it is the California version of the MUTCD Figure or Table.

This single document, being more comprehensive and easier to use, will lead to greater uniformity in application of traffic control devices in California, consistent with nationwide practices, by encouraging the traffic control device practitioners to use. This increased uniformity will improve transportation safety and mobility for both California residents and visitors, alike.

The Department gratefully acknowledges the FHWA's California Division, the CTCDC members, staff from various cities and counties and the Department's headquarters and districts staff for providing guidance and direction in the development of this document.

The Department hereby requests FHWA's approval of the attached California MUTCD (FHWA's MUTCD 2003 Revision 1, as amended for use in California). This document is also now posted on the Internet at the following web site:

<http://www.dot.ca.gov/hq/traffops/signtech/mutcdsupp/>

The Department encourages State and local agencies to start using this document immediately. If you have any questions, please contact Mr. Johnny Bhullar of my staff, at (916) 654-7312 or via e-mail at johnny\_bhullar@dot.ca.gov.

Sincerely,



STEVE PRICE  
Interim Division Chief  
Division of Traffic Operations

Attachment

Sample Page Sketches Showing Format Explanations

Manual title and exact version of FHWA's MUTCD that it incorporates

Page number

California MUTCD  
(FHWA's MUTCD 2003 Revision 1, as amended for use in California)

Page 2B-1

**CHAPTER 2B. REGULATORY SIGNS**

**Section 2B.01 Application of Regulatory Signs**  
**Standard:**  
Regulatory signs shall be used to inform road users of selected traffic laws or regulations and indicate the applicability of the legal requirements.  
Regulatory signs shall be installed at or near where the regulations apply. The signs shall clearly indicate the requirements imposed by the regulations and shall be designed and installed to provide adequate visibility and legibility in order to obtain compliance.  
Regulatory signs shall be retroreflective or illuminated to show the same shape and similar color by both day and night, unless specifically stated otherwise in the text discussion of a particular sign or group of signs (see Section 2A.08).  
The requirements for sign illumination shall not be considered to be satisfied by street, highway, or strobe lighting.  
**Support:**  
Orders, ordinances and resolutions by local authorities which affect State highways shall be approved by Department of Transportation.  
Signs required for enforcement are normally placed by, and at the expense of, the authority establishing the regulation.  
Refer to CVC 21461 for failure to obey a regulatory sign.

**Section 2B.02 Design of Regulatory Signs**  
**Support:**  
Most regulatory signs are rectangular, with the longer dimension vertical. The shapes and colors of regulatory signs are listed in Tables 2A-3, and 2A-4 2A-4(CA), respectively. Exceptions are specifically noted in the following Sections.  
The use of educational plaques to supplement symbol signs is described in Section 2A.13.  
**Guidance:**  
Changeable message signs displaying a regulatory message incorporating a prohibitory message that includes a red circle and slash on a static sign should display a red symbol that approximates the same red circle and slash as closely as possible.  
**Support:**  
Sign design details are contained in FHWA's Standard Highway Signs book and Department of Transportation's California Sign Specifications. See Section 1A.11 for information regarding these publications.  
Table 2B-101(CA) shows a list of California Regulatory Signs.  
Table 2B-102(CA) shows a list of MUTCD Regulatory Signs.

**Section 2B.03 Size of Regulatory Signs**  
**Standard:**  
The sizes for regulatory signs shall should be as shown in Table 2B-1.  
**Guidance:**  
The Freeway and Expressway sizes should be used for higher-speed applications to provide larger signs for increased visibility and recognition.  
**Option:**  
The Minimum size may be used on low-speed roadways where the reduced legend size would be adequate for the regulation or where physical conditions preclude the use of the other sizes.  
The Oversized size may be used for those special applications where speed, volume, or other factors result in conditions where increased emphasis, improved recognition, or increased legibility would be desirable.  
Signs larger than those shown in Table 2B-1 may be used (see Section 2A.12).

Chapter 2B - Regulatory Signs  
Part 2 - Signs

September 20, 2006

Unedited MUTCD text shown in "Times New Roman" black color font.

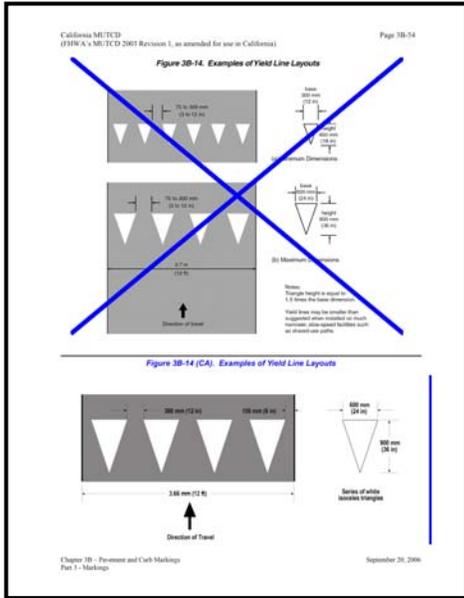
California text shown in "Arial Narrow" blue color font & blue margin line

Edited MUTCD text shown as strikethrough with blue margin line

CA MUTCD chapter number and chapter name  
CA MUTCD part number and part name

Date of adoption for CA MUTCD

Sample Page Sketches Showing Format Explanations



Entire MUTCD figure not applicable in California shown with blue X cross-out and the replacing California figure retains the same figure number but adds "(CA)" after the number and has a blue margin line.



California MUTCD (FHWA's MUTCD 2003 Revision 1, as amended for use in California) Page TC4-4

		Page
Section 4K.04	Speed Limit Sign Beacon	4K-2
Section 4K.05	Stop Beacon	4K-3
Section 4K.101(CA)	Warning Beacon Financing	4K-3
Section 4K.102(CA)	Signal Ahead Flashing Beacons	4K-3
Section 4K.103(CA)	Flashing Beacons at School Crossings	4K-4
Section 4K.104(CA)	Speed Limit Sign Beacon	4K-4
Section 4K.105(CA)	Flashing Beacons for Fire Stations	4K-4
Section 4K.106(CA)	Stop Sign Flashing Beacons	4K-4
Section 4K.107(CA)	Flashing Beacons for Bus Stops on Freeway Interchanges	4K-5
<b>CHAPTER 4L. IN-ROADWAY LIGHTS</b>		
Section 4L.01	Application of In-Roadway Lights	4L-1
Section 4L.02	In-Roadway Warning Lights at Crosswalks	4L-1
Section 4L.101(CA)	In-Roadway Warning Lights at Crosswalks Financing and Maintenance-State Highways	4L-2
<b>FIGURES</b>		
<b>CHAPTER 4C. TRAFFIC CONTROL SIGNAL NEEDS STUDIES</b>		
Figure 4C-1	Warrant 2, Four-Hour Vehicular Volume	4C-9
Figure 4C-2	Warrant 2, Four-Hour Vehicular Volume (70% Factor)	4C-9
Figure 4C-3	Warrant 3, Peak Hour	4C-10
Figure 4C-4	Warrant 3, Peak Hour (70% Factor)	4C-10
Figure 4C-101(CA)	Traffic Signal Warrants Worksheet	4C-11
Figure 4C-102(CA)	Traffic Count Worksheet	4C-15
Figure 4C-103(CA)	Traffic Signal Warrants Worksheet (Average Traffic Estimate Form)	4C-16
<b>CHAPTER 4D. TRAFFIC CONTROL SIGNAL FEATURES</b>		
Figure 4D-1	Maximum Mounting Height of Signal Faces Located Between 12 Meters (4 Feet) and 10 Meters (53 Feet) from Stop Line	4D-30
Figure 4D-2	Height and Location of Signal Faces	4D-31
Figure 4D-3	Typical Arrangements of Signal Lenses in Signal Faces	4D-32
Figure 4D-3(CA)	Typical Arrangements of Signal Lenses in Signal Faces	4D-33
Figure 4D-101(CA)	Left-Turn Phasing Methods (Phase Diagrams)	4D-34
Figure 4D-102(CA)	Typical Signal Layout at Offset Intersections, Signalized and Marked as a Single Intersection	4D-35
Figure 4D-103(CA)	Typical Signal Layout (Two Phase Operation)	4D-39
Figure 4D-104(CA)	Typical Signal Layout (Three Phase Operation)	4D-40
Figure 4D-105(CA)	Typical Signal Layout (Five Phase "Dual Left" Operation)	4D-41
Figure 4D-106(CA)	Typical Signal Layout (Six Phase "Opposing" Operation)	4D-42
Figure 4D-107(CA)	Typical Signal Layout (Eight Phase "Quad Left" Operation)	4D-43
Figure 4D-108(CA)	Typical Traffic Signal Installation	4D-44

Part 4 - Highway Traffic Signals September 20, 2006

California sections with no corresponding MUTCD sections begin with 101 and add "(CA)", increasing in sequence. The text is shown in "Arial Narrow" blue color font & blue margin line.

MUTCD Figure 4D-3 is applicable and is unedited. California figure adds to this MUTCD figure and retains the number 4D-3 adding "(CA)" with a blue margin line.

California figures with no corresponding MUTCD figures begin with 101 and add "(CA)", increasing in sequence with a blue margin line.

## **CALIFORNIA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES** ~~MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES~~

### **INTRODUCTION**

#### **Support:**

This California Manual on Uniform Traffic Control Devices (California MUTCD) is published by the State of California, Department of Transportation and is issued to adopt uniform standards and specifications for all official traffic control devices in California, in accordance with Section 21400 of the California Vehicle Code.

This California MUTCD incorporates two documents, Federal Highway Administration's Manual on Uniform Traffic Control Devices (2003 Edition Revision 1) dated November 20, 2004 and the MUTCD 2003 California Supplement dated May 20, 2004. It also incorporates all policies on traffic control devices issued by the California Department of Transportation that have been issued since May 20, 2004 and other editorial, errata and format changes that were necessary to update the previous documents.

#### **Standard:**

**The California MUTCD is hereby adopted as, and shall be the standard for all official traffic control devices, under Section 11340.9(h) of California Government Code and Section 21400 of California Vehicle Code.**

#### **Support:**

The California MUTCD supersedes and replaces the previously adopted (on May 20, 2004) MUTCD 2003 Edition and the MUTCD 2003 California Supplement as well as Chapters 4, 5, 6, 8, 10, 11, 12, and the traffic signals portion of chapter 9 of the 1996 Caltrans Traffic Manual, as amended, and all previous editions thereof. It does not supersede the Department's Standard Plans, Standard Specifications or the Standard Special Provisions publications.

Department of Transportation publishes Standard Specifications, Standard Special Provisions, Standard Plans and other manuals, which contain specifications and requirements for traffic control devices, including their use and placement, when performing work on State highways. In some cases those specifications and requirements can vary from, and be more stringent than those shown in the California MUTCD.

#### **Standard:**

**Whenever there is a discrepancy between the specifications and requirements contained in the California MUTCD, and those contained in the publications noted in the previous paragraph for work on State highways, those publications shall govern.**

**On State highways the California MUTCD shall mean to include the Department of Transportation's Standard Plans, Standard Specifications and Standard Special Provisions publications.**

**Nothing contained in the California MUTCD shall prevent the Department of Transportation from modifying, changing, or adopting new specifications deemed necessary.**

**Whenever there is a discrepancy between the specifications and requirements incorporated from FHWA's MUTCD and the California MUTCD amendments, the California MUTCD amendments shall govern.**

**Traffic control devices shall be defined as all signs, signals, markings, and other devices used to regulate, warn, or guide traffic, placed on, over, or adjacent to a street, highway, pedestrian facility, or bikeway by authority of a public agency having jurisdiction.**

**The Manual on Uniform Traffic Control Devices (MUTCD) is incorporated by reference in 23 Code of Federal Regulations (CFR), Part 655, Subpart F and shall be recognized as the national standard for all traffic control devices installed on any street, highway, or bicycle trail open to public travel in accordance with 23 U.S.C. 109(d) and 402(a). The policies and procedures of the Federal Highway Administration (FHWA) to obtain basic uniformity of traffic control devices shall be as described in 23 CFR 655, Subpart F.**

**Any traffic control device design or application provision contained in this Manual shall be considered to be in the public domain. Traffic control devices contained in this Manual shall not be protected by a patent, trademark, or copyright, except for the Interstate Shield and any other items owned by FHWA.**

**Support:**

This Manual is not applicable to privately owned and maintained roads or commercial establishments in California, unless the particular city or county enacts an ordinance or resolution to this effect. Refer to CVC Sections 21100, 21100.1, 21107, 21107.5, 21107.6, and 21107.7. However, the use of this Manual is encouraged on all privately owned and maintained roads or commercial establishments, in general, as a good practice. See Section 1A.07 for more information.

The need for uniform standards was recognized long ago. The American Association of State Highway Officials (AASHO), now known as the American Association of State Highway and Transportation Officials (AASHTO), published a manual for rural highways in 1927, and the National Conference on Street and Highway Safety (NCSHS) published a manual for urban streets in 1930. In the early years, the necessity for unification of the standards applicable to the different classes of road and street systems was obvious. To meet this need, a joint committee of AASHO and NCSHS developed and published the original edition of this Manual on Uniform Traffic Control Devices (MUTCD) in 1935. That committee, now called the National Committee on Uniform Traffic Control Devices (NCUTCD), though changed from time to time in name, organization, and personnel, has been in continuous existence and has contributed to periodic revisions of this Manual. The FHWA has administered the MUTCD since the 1971 edition. The FHWA and its predecessor organizations have participated in the development and publishing of the previous editions. There were eight previous editions of the MUTCD, and several of those editions were revised one or more times. Table I-1 traces the evolution of the MUTCD, including the two manuals developed by AASHO and NCSHS.

**Standard:**

**The U.S. Secretary of Transportation, under authority granted by the Highway Safety Act of 1966, decreed that traffic control devices on all streets and highways open to public travel in accordance with 23 U.S.C. 109(d) and 402(a) in each State shall be in substantial conformance with the Standards issued or endorsed by the FHWA.**

**Support:**

23 CFR 655.603 adopts the MUTCD as the national standard for any street, highway, or bicycle trail open to public travel in accordance with 23 U.S.C. 109(d) and 402(a). The "Uniform Vehicle Code (UVC)" is one of the publications referenced in the MUTCD. The UVC contains a model set of motor vehicle codes and traffic laws for use throughout the United States. The States are encouraged to adopt Section 15-116 of the UVC, which states that, "No person shall install or maintain in any area of private property used by the public any sign, signal, marking, or other device intended to regulate, warn, or guide traffic unless it conforms with the State manual and specifications adopted under Section 15-104."

**Text Headings**

The Standard, Guidance, Option, and Support material described in this edition of the MUTCD provide the transportation professional with the information needed to make appropriate decisions regarding the use of traffic control devices on streets and highways. The material in this edition is organized to better differentiate between Standards that must be satisfied for the particular circumstances of a situation, Guidances that should be followed for the particular circumstances of a situation, and Options that may be applicable for the particular circumstances of a situation.

Throughout this Manual the headings Standard, Guidance, Option, and Support are used to classify the nature of the text that follows. Figures, tables, and illustrations supplement the text and might constitute a Standard, Guidance, Option, or Support. The user needs to refer to the appropriate text to classify the nature of the figure, table, or illustration.

The figures shown in the California MUTCD are typical or example applications of the traffic control devices to illustrate their use and manner. Criteria for position, location, and use of traffic control devices in the figures is furnished solely for the purpose of guidance, understanding and information, and is not a legal standard unless. Engineering judgment must be used to apply these guidelines to the typical or example applications, or adjust them to fit individual field site conditions. The California MUTCD is not intended to be a substitute for engineering knowledge, experience or judgment.

**Standard:**

When used in this Manual, the text headings shall be defined as follows:

1. **Standard**—a statement of required, mandatory, or specifically prohibitive practice regarding a traffic control device. All standards are labeled, and the text appears in bold type. The verb shall is typically used. Standards are sometimes modified by Options.
2. **Guidance**—a statement of recommended, but not mandatory, practice in typical situations, with deviations allowed if engineering judgment or engineering study indicates the deviation to be appropriate. All Guidance statements are labeled, and the text appears in unbold type. The verb should is typically used. Guidance statements are sometimes modified by Options.
3. **Option**—a statement of practice that is a permissive condition and carries no requirement or recommendation. Options may contain allowable modifications to a Standard or Guidance. All Option statements are labeled, and the text appears in unbold type. The verb may is typically used.
4. **Support**—an informational statement that does not convey any degree of mandate, recommendation, authorization, prohibition, or enforceable condition. Support statements are labeled, and the text appears in unbold type. The verbs shall, should, and may are not used in Support statements.

For all purposes, regardless of the text heading, any sentence containing the verb shall or MUTCD text edited to the verb shall, shall be considered a Standard. Similarly, any sentence containing the verb should or MUTCD text edited to the verb should, shall be considered a Guidance and any sentence containing the verb may or MUTCD text edited to the verb may, shall be considered an Option.

Support:

For example, if under the Guidance text heading, the California edit shows “should” as crossed out and it is replaced with “shall” (e.g. “...~~should~~ shall...”), the edited sentence will be considered a Standard although the text heading is still Guidance and was not changed to Standard for clearer and brief editing purposes. This allows a single sentence in the middle of a long paragraph, in this example from a Guidance text paragraph to be elevated to a Standard without splitting the paragraph into two or three separate Standard and Guidance paragraphs. This allows the original MUTCD paragraph to be kept intact and keeps the flow of the MUTCD text and maintains the sequence. See California MUTCD sample page sketches on the front inside cover pages which show these and other format explanations with call outs.

**Metric and U.S. Customary (English) System of Units**

Throughout this Manual all dimensions and distances are provided in the International System of Units, a modernized version of the Metric system, and their English equivalent units are shown in parentheses.

In 1993, the Department had adopted the International System of Units as the preferred system of weights and measures to comply with federal law. The law was subsequently changed making the use of the Metric System optional. The Department made the decision in 2004 to readopt the U.S. Customary (English) system of units and measures as the preferred system. Guidance on the use of the Metric and U.S. Customary Systems of Measurement is available from Department of Transportation's Division of Design, Metric Program.

Guidance:

Before laying out distances or determining sign sizes, the public agency should decide whether to use the International System of Units (Metric) or the English equivalent units. The chosen units should be specified on plan drawings. The chosen unit of measurement should be made known to those responsible for designing, installing, or maintaining traffic control devices.

Except when a specific numeral is required by the text of a Section of this Manual, numerals shown on the sign images in the figures that specify quantities such as times, distances, speed limits, and weights should be regarded as examples only. When installing any of these signs, the numerals should be appropriately altered to fit the specific signing situation.

## Format, Reference and Manual Layout

### Support:

The following information will be useful when reference is being made to a specific portion of text in this Manual.

There are ten Parts in this Manual and each Part is comprised of one or more Chapters. Each Chapter is comprised of one or more Sections. Parts are given a numerical identification, such as Part 2-Signs. Chapters are identified by the Part number and a letter, such as Chapter 2B-Regulatory Signs. Sections are identified by the Chapter number and letter followed by a decimal point and a number, such as Section 2B.03-Size of Regulatory Signs.

The California MUTCD uses a format similar to the MUTCD. It incorporates FHWA's MUTCD in its entirety and explicitly shows which portions thereof are applicable or not applicable in California. The unedited MUTCD text is shown in "Times New Roman" font with black color. The California edited MUTCD text is also shown in "Times New Roman" font with black color but with strikethrough of all text portions that are not applicable in California and a blue margin line for easier distinction between the two types of MUTCD texts. The California text additions 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 MUTCD content, whether the pages are viewed on a computer monitor, as hard copies in color or as black photo copies.

All MUTCD figures and tables, or portions thereof, that are not applicable in California are shown with appropriate size blue X cross-outs. The MUTCD figures and tables that have been modified or added to, in the California MUTCD retain the same MUTCD Figure or Table number but include "(CA)" to indicate that it is the California version of the MUTCD Figure or Table. For example:

- Figure 3B-14(CA) Examples of Yield Line Layouts
- Table 9B-1(CA) California Minimum Sign Sizes for Bicycle Facilities

For California topics where there is no corresponding section, figure or table in the MUTCD, the California MUTCD gives a number that begins with 101 for that section, figure or table and increases in sequence, followed with a "(CA)" to indicate that this is a California created section, figure or table number. The blue margin line on the right is also added to all California figures and tables to keep them distinct from the MUTCD figures and tables. For example:

- Section 2B.112(CA) – Daylight Headlight Signs (S30(CA) Series)
- Figure 2C-101(CA) – Determination of Comfortable Speed From Ball Bank Indicator Readings
- Table 6F-102(CA) – Maximum Spacing of Channelizing Devices.

The California MUTCD contents within each chapter (Chapter 2B shown as example below) appear in a consistent order for ease of reference. This sequence is as follows:

1. MUTCD Sections per sequential numbering. For example, Sections 2B.01 through 2B.54.
2. California Sections per sequential numbering. For example, Sections 2B.101(CA) through 2B.113(CA).
3. MUTCD Figures (including edited and deleted) per sequential numbering. For example, Figures 2B-1 through 2B-22.
4. California Figures based upon or modifying MUTCD Figures are placed immediately after the respective MUTCD figure. For example, Figure 2B-14(CA) follows immediately after the deleted MUTCD Figure 2B-14 it replaces. Another example is Figure 2B-18(CA) which immediately follows MUTCD (undeleted) Figure 2B-18 as the California figure supplements the MUTCD Figure, it does not replace it.
5. California Figures that are stand alone and not based upon MUTCD Figures follow in sequence per their numbering. For example, Figures 2B-101(CA) through 2B-106(CA) follow after the end of MUTCD numbered figures.
6. MUTCD and California Tables follow the Figures under similar rules described above for the figures.

See California MUTCD sample page sketches on the front inside cover pages which show these and other format explanations with call outs.

Each Section is comprised of one or more paragraphs. The paragraphs are indented but are not identified by a number or letter. Paragraphs are counted from the beginning of each Section without regard to the intervening text headings (Standard, Guidance, Option, or Support). Some paragraphs have lettered or numbered items. As an example of how to cite this Manual, the phrase "Not less than 12 m (40 ft) beyond the stop line" that appears on Page 4D-12 of this Manual would be referenced in writing as "Section 4D.15, P7, D1(a)," and would be verbally referenced as "Item D1(a) of Paragraph 7 of Section 4D.15."

## Target Compliance Dates and Deleted Traffic Control Devices

### Standard:

In accordance with 23 CFR 655.603(b)(1), States or other Federal agencies that have their own MUTCDs or Supplements shall revise these MUTCDs or Supplements to be in substantial conformance with changes to the National MUTCD within 2 years of issuance of the changes. Unless a particular device is no longer serviceable, non-compliant devices on existing highways and bikeways shall be brought into compliance with the current edition of the National MUTCD as part of the systematic upgrading of substandard traffic control devices (and installation of new required traffic control devices) required pursuant to the Highway Safety Program, 23 U.S.C. § 402(a). In cases involving Federal-aid projects for new highway or bikeway construction or reconstruction, the traffic control devices installed (temporary or permanent) shall be in conformance with the most recent edition of the National MUTCD before that highway is opened or re-opened to the public for unrestricted travel [23 CFR 655.603(d)(2)]. The FHWA has the authority to establish other target compliance dates for implementation of particular changes to the MUTCD [23 CFR 655.603(d)(4)]. ~~These target compliance dates established by the FHWA shall be as follows:~~

~~Section 2A.19 Lateral Offset—crashworthiness of sign supports—January 17, 2013 for roads with posted speed limit of 80 km/h (50 mph) or higher.~~

~~Section 2B.03 Size of Regulatory Signs—increased sign sizes and other changes to Table 2B-1—10 years from the effective date of the Final Rule for the 2003 MUTCD.~~

~~Section 2B.04 STOP Sign (R1-1)—4 WAY plaque requirement—January 17, 2004.~~

~~Section 2B.06 STOP Sign Placement—signs mounted on back of STOP sign—10 years from the effective date of the Final Rule for the 2003 MUTCD.~~

~~Section 2B.09 YIELD Sign Applications—changes in YIELD sign application criteria from the 1988 MUTCD—January 17, 2011.~~

~~Section 2B.10 YIELD Sign Placement—signs mounted on back of YIELD sign—10 years from the effective date of the Final Rule for the 2003 MUTCD.~~

~~Section 2B.11 Yield Here to Pedestrians Signs (R1-5, R1-5a)—new section—10 years from the effective date of the Final Rule for the 2003 MUTCD.~~

~~Section 2B.13 Speed Limit Sign (R2-1)—color of changeable message legend of YOUR SPEED—10 years from the effective date of the Final Rule for the 2003 MUTCD.~~

~~Section 2B.25 Reversible Lane Control Signs (R3-9d, R3-9f through R3-9i)—removal of R3-9c and R3-9e signs—10 years from the effective date of the Final Rule for the 2003 MUTCD.~~

~~Section 2B.26 Preferential Only Lane Signs (R3-10 through R3-15)—10 years from the effective date of the Final Rule for the 2003 MUTCD.~~

~~Section 2B.27 Preferential Only Lanes for High-Occupancy Vehicles (HOVs)—new section in Millennium Edition—January 17, 2007.~~

~~Section 2B.28 Preferential Only Lane Sign Applications and Placement—10 years from the effective date of the Final Rule for the 2003 MUTCD.~~

~~Section 2B.37 ONE WAY Signs (R6-1, R6-2)—placement requirement at intersecting alleys—January 17, 2008.~~

~~Section 2B.46 Photo Enforced Signs (R10-18, R10-19)—new section—10 years from the effective date of the Final Rule for the 2003 MUTCD.~~

~~Section 2B.52 Hazardous Material Signs (R14-2, R14-3)—change in sign legend—10 years from the effective date of the Final Rule for the 2003 MUTCD.~~

~~Section 2C.04 Size of Warning Signs—increased sizes of W4-1, W5-2, W6-3, and W12-1 signs—January 17, 2008.~~

~~Section 2C.04 Size of Warning Signs—sizes of W1 Series Arrows signs, W7 Series truck runaway signs, W12-2p low clearance signs, and W10-1 advance grade crossing sign—10 years from the effective date of the Final Rule for the 2003 MUTCD.~~

~~Section 2C.11 Truck Rollover Warning Signs (W1-13, W1-13a)—new section—10 years from the effective date of the Final Rule for the 2003 MUTCD.~~

- Section 2C.16 NARROW BRIDGE Sign (W5-2) — elimination of symbol sign — 10 years from the effective date of the Final Rule for the 2003 MUTCD.**
- Section 2C.25 PAVEMENT ENDS Sign (W8-3) — removal of symbol sign — January 17, 2011.**
- Section 2C.26 Shoulder Signs (W8-4, W8-9, and W8-9a) — removal of symbol signs — January 17, 2011.**
- Section 2C.30 Speed Reduction Signs (W3-5, W3-5a) — removal of R2-5 Series Reduced Speed Ahead signs and use of W3-5 or W3-5a warning signs instead — 15 years from the effective date of the Final Rule for the 2003 MUTCD.**
- Section 2C.31 Merge Signs (W4-1, W4-5) — Entering Roadway Merge sign (W4-1a) — 10 years from the effective date of the Final Rule for the 2003 MUTCD.**
- Section 2C.32 Added Lane Signs (W4-3, W4-6) — Entering Roadway Added Lane sign (W4-3a) — 10 years from the effective date of the Final Rule for the 2003 MUTCD.**
- Section 2C.33 Lane Ends Signs (W4-2, W9-1, W9-2) — new design of W4-2 sign — 10 years from the effective date of the Final Rule for the 2003 MUTCD.**
- Section 2C.34 Two-Way Traffic Sign (W6-3) — transition from one-way street — 5 years from the effective date of the Final Rule for the 2003 MUTCD.**
- Section 2C.37 Intersection Warning Signs (W2-1 through W2-6) — new design of Circular Intersection (W2-6) sign — 10 years from the effective date of the Final Rule for the 2003 MUTCD.**
- Section 2C.40 Vehicular Traffic Signs (W8-6, W11-1, W11-5, W11-5a, W11-6, W11-8, W11-10, W11-11, W11-12, W11-14) — new symbol signs W11-1, W11-5, W11-5a, W11-6, W11-11, and W11-14 — 10 years from the effective date of the Final Rule for the 2003 MUTCD.**
- Section 2C.41 Nonvehicular Signs (W11-2, W11-3, W11-4, W11-7, W11-9) — elimination of crosswalk lines from crossing signs and use of diagonal downward pointing arrow supplemental plaque (W16-7) if at the crossing — January 17, 2011.**
- Section 2C.53 PHOTO ENFORCED Plaque (W16-10) — new section — 10 years from the effective date of the Final Rule for the 2003 MUTCD.**
- Section 2D.38 Street Name Sign (D3-1) — symbol sizes, 150 mm (6 in) letter sizes for lettering on ground-mounted Street Name signs on roads that are not multi-lane streets with speed limits greater than 60 km/h (40 mph), other new provisions of Millennium Edition — January 9, 2012.**
- Section 2D.38 Street Name Sign (D3-1) — letter sizes on ground-mounted signs on multi-lane streets with speed limits greater than 60 km/h (40 mph) and letter sizes on overhead-mounted signs — 15 years from the effective date of the Final Rule of the 2003 MUTCD.**
- Section 2D.39 Advance Street Name Signs (D3-2) — new section in 2000 MUTCD and revisions in 2003 MUTCD — 15 years from the effective date of the Final Rule for the 2003 MUTCD.**
- Section 2D.45 General Service Signs (D9 Series) — Traveler Info Call 511 (D12-5) sign, Channel 9 Monitored (D12-3) sign — 10 years from the effective date of the Final Rule for the 2003 MUTCD.**
- Section 2D.46 Reference Location Signs (D10-1 through D10-3) and Intermediate Reference Location Signs (D10-1a through D10-3a) — location and spacing of Reference Location signs and design of Intermediate Reference Location signs — 10 years from the effective date of the Final Rule for the 2003 MUTCD.**
- Section 2E.28 Interchange Exit Numbering — size of exit number plaque — January 17, 2008.**
- Section 2E.28 Interchange Exit Numbering — LEFT on exit number plaques for left exits — 5 years from the effective date of the Final Rule for the 2003 MUTCD.**
- Section 2E.30 Advance Guide Signs — advance placement distance — January 17, 2008.**
- Section 2E.54 Reference Location Signs and Enhanced Reference Location Signs (D10-4, D10-5) — design of Enhanced Reference Location signs and Intermediate Enhanced Reference Location signs — 10 years from the effective date of the Final Rule for the 2003 MUTCD.**
- Section 2E.59 Preferential Only Lane Signs — new section in 2003 Edition — 10 years from the effective date of the Final Rule for the 2003 MUTCD.**
- Section 2F.05 Size of Lettering — minimum height of letters and numerals on specific service signs — January 17, 2011.**
- Section 2I.03 EVACUATION ROUTE Sign (EM-1) — new design and size of EM-1 sign — 15 years from the effective date of the Final Rule for the 2003 MUTCD.**

- ~~Section 3B.01 Yellow Centerline Pavement Markings and Warrants—new section in Millennium Edition—January 3, 2003.~~
- ~~Section 3B.03 Other Yellow Longitudinal Pavement Markings—spacing requirements for pavement marking arrows in two-way left-turn lanes—5 years from the effective date of the Final Rule for the 2003 MUTCD.~~
- ~~Section 3B.07 Warrants for Use of Edge Lines—new section in Millennium Edition—January 3, 2003.~~
- ~~Section 3B.17 Crosswalk Markings—gap between transverse lines of a crosswalk—10 years from the effective date of the Final Rule for the 2003 MUTCD.~~
- ~~Section 3B.19 Pavement Word and Symbol Markings—typical spacing of lane-use arrows in two-way left-turn lanes shown in Figure 3B-7—5 years from the effective date of the Final Rule for the 2003 MUTCD.~~
- ~~Section 3C.01 Object Marker Design and Placement Height—width of stripes on Type 3 striped marker—10 years from the effective date of the Final Rule for the 2003 MUTCD.~~
- ~~Section 4D.01 General—location of signalized midblock crosswalks—10 years from the effective date of the Final Rule for the 2003 MUTCD.~~
- ~~Section 4D.05 Application of Steady Signal Indications—Item B.4 in STANDARD—5 years from the effective date of the Final Rule for the 2003 MUTCD.~~
- ~~Section 4D.12 Flashing Operation of Traffic Control Signals—duration of steady red clearance interval in change from red-red flashing mode to steady (stop-and-go) mode—10 years from the effective date of the Final Rule for the 2003 MUTCD.~~
- ~~Section 4E.06 Accessible Pedestrian Signals—new section in Millennium Edition—January 17, 2005.~~
- ~~Section 4E.07 Countdown Pedestrian Signals—new section—10 years from the effective date of the Final Rule for the 2003 MUTCD for countdown pedestrian signal hardware; 3 years from the effective date of the Final Rule for the 2003 MUTCD for operational requirements of countdown pedestrian signals.~~
- ~~Section 4E.09 Accessible Pedestrian Signal Detectors—new section in Millennium Edition—January 17, 2005.~~
- ~~Section 4E.10 Pedestrian Intervals and Signal Phases—pedestrian clearance time sufficient to travel to far side of the traveled way—5 years from the effective date of the Final Rule for the 2003 MUTCD.~~
- ~~Section 5C.05 NARROW BRIDGE Sign (W5-2)—elimination of symbol sign—10 years from the effective date of the Final Rule for the 2003 MUTCD.~~
- ~~Section 6D.01 Pedestrian Considerations—all new provisions for pedestrian accessibility—5 years from the effective date of the Final Rule for the 2003 MUTCD.~~
- ~~Section 6D.02 Accessibility Considerations—5 years from the effective date of the Final Rule for the MUTCD.~~
- ~~Section 6D.03 Worker Safety Considerations—high-visibility apparel requirements—3 years from the effective date of the Final Rule for the 2003 MUTCD.~~
- ~~Section 6E.02 High-Visibility Safety Apparel—high-visibility apparel requirements for flaggers—3 years from the effective date of the Final Rule for the 2003 MUTCD.~~
- ~~Section 6F.03 Sign Placement—crashworthiness of sign supports—January 17, 2005.~~
- ~~Section 6F.58 Channelizing Devices—crashworthiness—January 17, 2005.~~
- ~~Section 6F.59 Cones—width of retroreflective stripes—5 years from the effective date of the Final Rule for the 2003 MUTCD.~~
- ~~Section 6F.63 Type I, II, or III Barricades—crashworthiness—January 17, 2005.~~
- ~~Section 6F.66 Longitudinal Channelizing Barricades—crashworthiness—January 17, 2005.~~
- ~~Section 6F.82 Crash Cushions—crashworthiness—January 17, 2005.~~
- ~~Section 7B.08 School Advance Warning Assembly (S1-1 with Supplemental Plaque)—use of AHEAD plaque (W16-9p) or distance plaque (W16-2 or W16-2a)—January 17, 2011.~~
- ~~Section 7B.09 School Crosswalk Warning Assembly (S1-1 with Diagonal Arrow)—elimination of crosswalk lines from crossing signs and use of diagonal downward-pointing arrow supplemental plaque (W16-7)—January 17, 2011.~~

- ~~Section 7B.12 Reduced Speed School Zone Ahead Sign (S4-5, S4-5a)—15 years from the effective date of the Final Rule for the 2003 MUTCD.~~
- ~~Section 7E.04 Uniform of Adult Crossing Guards and Student Patrols—requirement for high-visibility apparel for adult crossing guards—5 years from the effective date of the Final Rule for the 2003 MUTCD.~~
- ~~Section 8B.03 Highway-Rail Grade Crossing (Crossbuck) Sign (R15-1) and Number of Tracks Sign (R15-2)—retroreflective strip on crossbuck support—January 17, 2011.~~
- ~~Section 8B.04 Highway-Rail Grade Crossing Advance Warning Signs (W10 Series)—removal of existing W10-6 series signs—January 17, 2006.~~
- ~~Section 8D.07 Traffic Control Signals at or Near Highway-Rail Grade Crossings—pre-signals—10 years from the effective date of the Final Rule for the 2003 MUTCD.~~
- ~~Section 9B.04 Bicycle Lane Signs (R3-17, R3-17a, R3-17b)—deletion of preferential lane symbol (diamond) for bicycle lane signs—January 17, 2006.~~
- ~~Section 9B.17 Bicycle Warning Sign (W11-1)—elimination of crosswalk lines from crossing signs and use of diagonal downward pointing arrow supplemental plaque (W16-7) if at the crossing—January 17, 2011.~~
- ~~Chapter 9C Markings—deletion of preferential lane symbol (diamond) for bicycle pavement markings—January 17, 2007.~~
- ~~Part 10 Traffic Controls for Highway-Light Rail Transit Grade Crossings—automatic gates, flashing-light signals, and blank-out signs—January 17, 2011.~~
- ~~Section 10C.15 Highway-Rail Grade Crossing Advance Warning Signs (W10 Series)—removal of existing W10-6 series signs—January 17, 2006.~~
- All these MUTCD target compliance dates (beginning with Section 2A.19 and ending with Section 10C.15) are deleted and shall not apply in California.

Option:

In order for maintenance personnel to understand what to do when replacing a damaged non-compliant traffic control device, agencies may establish a policy regarding whether to replace the device in kind or to replace it with a compliant device.

Support:

Often it is desirable to upgrade to a compliant device at the time of this maintenance of a damaged device. However, it might be appropriate to replace the damaged non-compliant device in kind at the time of this maintenance activity if engineering judgment indicates that:

- A. One compliant device in the midst of a series of adjacent non-compliant devices could potentially be confusing to road users; and/or
- B. The anticipated schedule for replacement of the whole series of non-compliant devices will result in achieving timely compliance with the MUTCD.

Standard:

Unless allowed per the Option below, in cases involving new highway or bikeway construction or reconstruction, the traffic control devices installed (temporary or permanent) shall be in conformance with the current edition of the California MUTCD before that highway is opened or re-opened to the public for unrestricted travel pursuant to the California Vehicle Code 21401.

Option:

In cases involving new highway or bikeway construction or reconstruction, the traffic control devices installed (temporary or permanent) may be in accordance with previous traffic control device standards of May 20, 2004 per MUTCD 2003 and MUTCD 2003 California Supplement or prior to that of Caltrans Traffic Manual, if in the judgment of the engineer, incorporating the California MUTCD standards would impose a significant delay or a significant increase in costs for the project.

Support:

Reconstruction, as used in the previous Standard and Option topics, for the purpose of a traffic control device would mean if a particular device is modified in any form or shape or is relocated. If a reconstruction project does not modify or relocate a traffic control device, although encouraged, there would be no obligation to upgrade the traffic control device per current edition of the California MUTCD standards.

**Standard:**

Unless allowed per the option below, non-compliant traffic control devices on existing highways and bikeways shall be brought into compliance with the California MUTCD as part of the systematic upgrading of substandard traffic control devices (and installation of new required traffic control devices) required pursuant to the California Vehicle Code 21401.

**Option:**

All traffic control devices on existing highways and bikeways that have become non-compliant per California MUTCD adopted standards may remain in service through the end of their useful service life, unless identified specifically with a target compliance date per Table I-101(CA).

To limit financial impact on agencies and for fiscal responsibility reasons, existing inventory of non-compliant traffic control devices, except those identified per Table I-101(CA), may continue to be used until these inventories are depleted.

**Support:**

The signs listed in Table I-101(CA) are non-compliant per this California MUTCD and further; they have been singled out for specific target compliance dates by the California Traffic Control Devices Committee and California Department of Transportation.

Failure to replace a sign listed in Table I-101(CA) by its target compliance date does not reduce the effectiveness of the sign to impart information to the road user.

For ease of reference, Figure I-101(CA) shows the sign sketches of the deleted signs that have target compliance dates.

**Standard:**

The signs listed in Table I-101(CA), although used in the past, shall no longer be used in California. Further, any such signs on existing highways and bikeways shall be removed, and replaced if appropriate, by the target compliance dates shown in Table I-101(CA).

**Support:**

The signs listed in Table I-102(CA) are old California signs that have been deleted for application in the past. These signs are non-compliant per this California MUTCD but do not have any specific target compliance dates. Hence, any such signs on existing highways and bikeways can remain in service through the end of their useful service life.

**Standard:**

The signs listed in Table I-102(CA), although used in the past, shall no longer be used in California.

**Support:**

The signs listed in Table I-103(CA) are MUTCD signs that have been deleted throughout this Manual, wherever they were reference by the MUTCD. Refer to the section listed in this table for more details regarding the reason for the deletion and/or what signs they are replaced with.

**Standard:**

The signs listed in Table I-103(CA) shall not be used in California.

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**Figure I-101 (CA). Deleted California Signs with Target Compliance Dates**



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Year	Name	Month / Year Revised
1927	Manual and Specifications for the Manufacture, Display, and Erection of U.S. Standard Road Markers and Signs (for rural roads)	4/29, 12/31
1930	Manual on Street Traffic Signs, Signals, and Markings (for urban streets)	No revisions
1935	Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD)	2/39
1942	Manual on Uniform Traffic Control Devices for Streets and Highways — War Emergency Edition	No revisions
1948	Manual on Uniform Traffic Control Devices for Streets and Highways	9/54
1961	Manual on Uniform Traffic Control Devices for Streets and Highways	No revisions
1971	Manual on Uniform Traffic Control Devices for Streets and Highways	11/71, 4/72, 3/73, 10/73, 6/74, 6/75, 9/76, 12/77
1978	Manual on Uniform Traffic Control Devices for Streets and Highways	12/79, 12/83, 9/84, 3/86
1988	Manual on Uniform Traffic Control Devices for Streets and Highways	1/90, 3/92, 9/93, 11/94, 12/96, 6/98, 1/00
2000	Manual on Uniform Traffic Control Devices for Streets and Highways — Millennium Edition	7/02
2003	Manual on Uniform Traffic Control Devices for Streets and Highways	

Table I-1(CA) Evolution of the California MUTCD

Year	Name
1955	Planning Manual of Instructions, Part 8 – Traffic Department of Public Works, Division of Highways
1972	Traffic Manual Department of Public Works, Division of Highways
1996	Traffic Manual (Metric Version) Department of Transportation, Division of Traffic Operations
2004	FHWA's MUTCD 2003 & MUTCD 2003 California Supplement Department of Transportation, Division of Traffic Operations
2006	California MUTCD Department of Transportation, Division of Traffic Operations

Table I-101(CA) Deleted California Signs with Target Compliance Dates

Sign Code	Title/Description	Comment	Target Compliance Date
R16B(CA)	NO RIGHT TURN word message	Use No Right Turn (R3-1) symbol sign	January 1, 2010
R17B(CA)	NO LEFT TURN word message	Use No Left Turn (R3-2) symbol sign	January 1, 2010
R19(CA)	NO LEFT OR U TURN word message	Use No Left or U Turn (R3-18) symbol sign	January 1, 2010
R34A(CA)	No U TURN word message	Use No U Turn (R3-4) symbol sign	January 1, 2010
SR2 M(CA)	SPEED LIMIT 35 mph 56 km/h	1976 Metric sign never implemented	January 1, 2007
SR3 M(CA)	END 35 mph 56 km/h SPEED LIMIT	1976 Metric sign never implemented	January 1, 2007
SR24 1(CA)	STOP ON RED SIGNAL word message	Use STOP HERE ON RED with arrow (R10-6) sign	January 1, 2010
SR31(CA)	SCHOOL STOP CROSSING round shape Paddle	Use STOP (C28A(CA)) octagon shape Paddle	January 1, 2010
SR36(CA)	CLOSED Red on White octagon shape sign	Use ROAD CLOSED (R11-2) sign	January 1, 2010
W54(CA)	Pedestrian Crossing Symbol with crosswalk lines	Use Pedestrian Crossing symbol (W11-2) without crosswalk lines & diagonal downward pointing arrow (W16-7P) plaque	January 1, 2011
W66(CA)	School Crossing Symbol with crosswalk lines	Use School Crossing symbol (S1-1 ) without crosswalk lines & diagonal downward pointing arrow (W16-7P) plaque	January 1, 2011
W66A(CA)	SCHOOL XING word message	Use School Crossing symbol (S1-1 ) without crosswalk lines & diagonal downward pointing arrow (W16-7P) plaque	January 1, 2011
SW1 1(CA)	TRAFFIC FROM RIGHT(LEFT) DOES NOT STOP with arrow	Use CROSS TRAFFIC DOES NOT STOP (W4-4P) plaque, which is without the arrow	January 1, 2007
SW6 M(CA)	40 mph - 64 km/h	1976 Metric sign never implemented	January 1, 2007
SW18 2.1(CA)	VERTICAL CLEARANCE __ FT. __ IN.	Use Low Clearance (W12-2 ) sign or rectangular (W12-2P) plaque	January 1, 2010
SW25(CA)	School Symbol - SCHOOL XING with crosswalk lines	Use School Crossing symbol (S1-1 ) without crosswalk lines & diagonal downward pointing arrow (W16-7P) plaque	January 1, 2011
SW27(CA)	Skewed RR Crossing symbol with Motorcycle symbol	Use Skewed Crossing symbol (W10-12) sign	January 1, 2015
SW27 1(CA)	Skewed RR Crossing symbol with Motorcycle & Bike symbol	Use Skewed Crossing symbol (W10-12) sign	January 1, 2015
SW28(CA)	STEEL DECK with Motorcycle symbol	Use modified STEEL BRIDGE DECK (SW28 (CA)) word message sign	January 1, 2015
SW72 M(CA)	EXIT 30 mph 48 km/h	1976 Metric sign never implemented	January 1, 2007

Table I-102(CA) Deleted California Signs - No Target Compliance Dates (Sheet 1 of 5)

California Code	Title/Description	Comment
R6-1(CA)	AUTOS WITH TRAILERS - TRUCKS 55 MAXIMUM	Replaced by two separate signs: TRUCKS, 3 AXLES OR MORE 55 MAXIMUM (R6-3(CA)) & ALL VEHICLES WHEN TOWING 55 MAXIMUM (R6-4(CA))
R6-2(CA)	TRUCKS - AUTOS WITH TRAILERS RIGHT 2 LANES ONLY	Replaced by two separate signs: TRUCKS 3 AXLES OR MORE RIGHT 2 LANES ONLY (R6-3A(CA)) & ALL VEHICLES WHEN TOWING RIGHT 2 LANES ONLY (R6-4A(CA))
R10(CA)	ONE WAY (Pentagon shape)	Use ONE WAY (R6-1) (Rectangular shape)
R13(CA)	NO TURN ON RED word message	Use symbolic No Turn On Red (R10-11)
R20E(CA)	SEMI OVER 38 FT KINGPIN TO REAR AXLE	Use No Trucks Variable Message (R20-1(CA)) or TRACTOR-SEMIS OVER (X FEET) KINGPIN TO REAR AXLE NOT ADVISED (SW48(CA))
R41(CA)	RIGHT TURN ONLY	Use Right Turn Arrow ONLY (R3-5R)
R42(CA)	LEFT TURN ONLY	Use Left Turn Arrow ONLY (R3-5L)
R49(CA)	NO PED CROSSING - USE CROSSWALK	Use No Pedestrian Crossing (R9-3a) & USE CROSSWALK (R9-3b)
R49A(CA)	NO PED CROSSING - CROSS HERE	Use No Pedestrian Crossing (R9-3a) & USE CROSSWALK (R9-3b)
R67A(CA)	2 WAY TURN LANE	Use Two-Way Left Turn Only (R3-9a or R3-9b) symbol signs
R68(CA)	PASSING LANE AHEAD	Use PASSING LANE (X MILES) or AHEAD G69(CA)
R82(CA)	BUS CARPOOL LANE (HOV) AHEAD	Refer Caltrans HOV Guidelines 2003 Edition
R83(CA)	(HOV) BUS CARPOOL LANE AHEAD	Refer Caltrans HOV Guidelines 2003 Edition
R83A(CA)	6AM-9AM MON-FRI	Refer Caltrans HOV Guidelines 2003 Edition
R84(CA)	BUS CARPOOL LANE (HOV) ENDS	Refer Caltrans HOV Guidelines 2003 Edition
R84A(CA)	___ MILE	Refer Caltrans HOV Guidelines 2003 Edition
R85(CA)	(HOV) BUS CARPOOL LANE ENDS	Refer Caltrans HOV Guidelines 2003 Edition
R86-1(CA)	(HOV) CENTER LANE BUSES AND CARPOOLS ONLY 6AM-9AM 3PM-6PM MON-FRI	Refer Caltrans HOV Guidelines 2003 Edition
R87(CA)	(HOV) BUSES AND CARPOOLS WITH 3 OR MORE 6AM-9AM (Down Arrow) MON-FRI	Refer Caltrans HOV Guidelines 2003 Edition
R91A(CA)	MOTORCYCLES OK	Refer Caltrans HOV Guidelines 2003 Edition
R93(CA)	CARPOOL IS 3 OR MORE PERSONS PER VEHICLE	Refer Caltrans HOV Guidelines 2003 Edition
R93-1(CA)	CARPOOL IS 3 OR MORE PERSONS PER VEHICLE	Refer Caltrans HOV Guidelines 2003 Edition
R94A(CA)	MOTORCYCLES OK	Refer Caltrans HOV Guidelines 2003 Edition
R96A(CA)	NO PED XING	Use NO PEDESTRIAN CROSSING (R9-3)
R96C(CA)	PEDESTRIANS PROHIBITED	Use No Pedestrian Crossing (R9-3a)
R100(CA)	SPECIAL PLACARD OR LICENSE PLATE REQUIRED	Use TOW-AWAY SPECIAL PLACARD OR LICENSE PLATE REQUIRED (R100A(CA))
SR4(CA)	SCHOOL SPEED LIMIT 25 WHEN CHILDREN ARE PRESENT	Use School Speed Limit Assembly C - SCHOOL (S4-3), Speed Limit (R2-1) & WHEN CHILDREN ARE PRESENT (S4-2)

Table I-102(CA) Deleted California Signs - No Target Compliance Dates (Sheet 2 of 5)

California Code	Title/Description	Comment
SR14(CA)	SPEED ENFORCED BY AIRCRAFT (Plane symbol)	Use SPEED ENFORCED BY AIRCRAFT (R48-2(CA)), word message, no symbol
SR21-1(CA)	CAMPING PROHIBITED	Miscellaneous
SR38(CA)	CARPOOL PARKING ONLY	Refer Caltrans HOV Guidelines 2003 Edition
SR50(CA)	CARPOOL VIOLATION \$___ MINIMUM FINE	Refer Caltrans HOV Guidelines 2003 Edition
SR52A(CA)	NO VEHICLES ON TRACKS	Use DO NOT DRIVE ON TRACKS (R15-6a)
W16(CA)	GROOVED PAVEMENT	Changed to GROOVED PAVEMENT (SW45) on 6/17/87, change wasn't reflected in 1996 TM
W53(CA)	NOT A THROUGH STREET	Use DEAD END (W14-1) or NO OUTLET (W14-2)
W75(CA)	LANE ENDS MERGE LEFT (RIGHT)	Use Lane Ends (W4-2)
W75A(CA)	(HOV) LANE ENDS MERGE RIGHT	Use (HOV) LANE ENDS MERGE LEFT (RIGHT) (W75-1(CA))
W80(CA)	XING	Use Vehicular/Nonvehicular Traffic (W11 series) symbol signs and/or Diagonal Downward Pointing Arrow (W16-7p) plaque.
W82A(CA)	TROLLEY XING	Use Light Rail Transit (Trolley) Crossing W82(CA)
W84(CA)	TURNOUT 1/4 MILE	Never approved
SW1-2(CA)	OPPOSING TRAFFIC DOES NOT STOP	Use CROSS TRAFFIC DOES NOT STOP (W4-4P) with alternate message per section 2C.50.
SW8-1(CA)	TRUCKS CROSSING TO SCALES	None
SW14-1(CA)	FLOODED DURING STORM	Use SUBJECT TO FLOODING (W55B(CA))
SW21-1(CA)	FIRE STATION WATCH FOR TRUCKS	Use Emergency Vehicle (W11-8) symbol sign
SW21A(CA)	FIRE STATION	Use Emergency Vehicle (W11-8) symbol sign
SW21C(CA)	FIRE STATION	Use Emergency Vehicle (W11-8) symbol sign
SW24(CA)	School Symbol - SCHOOL	Use School Advance Warning (S1-1)
SW29(CA)	NARROW SUBWAY	Narrow application
SW30(CA)	ISLANDS	Miscellaneous
SW31(CA)	DIPS	Use DIP (W8-2) with NEXT X Miles (W7-3a) plaque
SW42(CA)	Double Head Arrow (Diamond shape)	Use Two-Direction Large Arrow (W1-7)
SW43(CA)	Single Head Arrow (Diamond shape)	Use One-Direction Large Arrow (W1-6)
SW53(CA)	___ WAY SIGNAL	Not commonly understood
SW56A(CA)	GOLF CART XING	Use Golf Cart (W11-11) symbol sign
G7-3(CA)	Street Name (FAIR OAKS BLVD)	Use Street Name (D3 or G7-1(CA))
G18(CA)	MT. WHITNEY FISH HATCHERY	Miscellaneous
G32-1(CA)	3-Head Arrow	Use Directional Arrow Auxiliary (M6 Series)
G62(CA)	SPEEDOMETER CHECK AHEAD	Miscellaneous
G63(CA)	MILE 0	Miscellaneous
G64(CA)	END CHECK	Miscellaneous
G66-14A(CA)	EMERGENCY MEDICAL CARE	Use EMERGENCY MEDICAL CARE (D9-13c)
G66-16(CA)	Hospital symbol - HOSPITAL	Use Hospital (D9-2)
G66-20(CA)	NATURAL GAS	Use Compressed Natural Gas (G66-22A(CA)), Liquefied Natural Gas (G66-22B(CA)) or LP GAS (G81-52(CA))
G66-21B(CA)	NEXT EXIT	Use NEXT RIGHT/LEFT (G58(CA))
G70(CA)	PASSING LANE AHEAD	Use PASSING LANE (X MILES) or AHEAD G69(CA)

Table I-102(CA) Deleted California Signs - No Target Compliance Dates (Sheet 3 of 5)

California Code	Title/Description	Comment
G70-1(CA)	445A	Use Single Line EXIT XXXX (G70-3(CA))
G70-2.2(CA)	EXIT 444	Use Single Line EXIT XX (G70-2(CA))
G70-3.2(CA)	EXIT 445A	Use Single Line EXIT XXXX (G70-3(CA))
G81-1(CA)	HIGHWAY PATROL	Use Highway Patrol (G66-57(CA))
G81-4(CA)	PHONE WATER	Use Telephone (D9-1) & Drinking Water (RG-050)
G81-7(CA)	HOSPITAL PHONE with Arrows	Use Telephone (D9-1) & Hospital (D9-2) with Directional Arrow Auxiliary (M6 series)
G81-9(CA)	HOSPITAL WATER PHONE with Arrows	Use Telephone (D9-1), Hospital (D9-2) & RG-050 with Directional Arrow Auxiliary (M6 series)
G81-11(CA)	HOSPITAL WATER PHONE with Arrows	Use Telephone (D9-1), Hospital (D9-2) & RG-050 with Directional Arrow Auxiliary (M6 series)
G81-13(CA)	HOSPITAL WATER PHONE with Arrows	Use Telephone (D9-1), Hospital (D9-2) & RG-050 with Directional Arrow Auxiliary (M6 series)
G81-15(CA)	HOSPITAL WATER PHONE with Arrows	Use Telephone (D9-1), Hospital (D9-2) & RG-050 with Directional Arrow Auxiliary (M6 series)
G81-17(CA)	HIGHWAY PATROL NEXT RIGHT	Use Highway Patrol (G66-57(CA)) & BRAKE CHECK AREA (G58(CA))
G81-27(CA)	CARPPOOL VANPOOL INFO CALL ...	Use Carpool Information (SG19(CA)) or Park & Ride Facility/Carpool Information (SG20(CA))
G81-58(CA)	HOSPITAL	Use Hospital (D9-2)
G91-1(CA)	SKIING	Use Skiing (Bobbing) (RS-030), Skiing (Cross Country) (RS-040) or Skiing (Downhill) (RS-050)
G91-4(CA)	CAMPING BOATING	Use Camping (Tent) (RM-010), Camping (Trailer) (RM-020), Motorboating (RW-070), Ramp (Launch) (RW-080), Rowboating (RW-090) or Sailboating (RW-100)
G91-7(CA)	CAMPING SKIING with Arrows	Use Skiing (Bobbing) (RS-030), Skiing (Cross Country) (RS-040), Skiing (Downhill) (RS-050), Camping (Tent) (RM-010) or Camping (Trailer) (RM-020) with Directional Arrow Auxiliary (M6 series)
G91-9(CA)	CAMPING PICNICKING BOATING with Arrow	Use Camping (Tent) (RM-010), Camping (Trailer) (RM-020), Picnic Area (RM-120), Motorboating (RW-070), Ramp (Launch) (RW-080), Rowboating (RW-090) or Sailboating (RW-100) with Directional Arrow Auxiliary (M6 series)
G91-11(CA)	SKIING BOATING CAMPING with Arrows	Use Skiing (Water) (RW-110), Camping (Tent) (RM-010), Camping (Trailer) (RM-020), Motorboating (RW-070), Ramp (Launch) (RW-080), Rowboating (RW-090) or Sailboating (RW-100) with Directional Arrow Auxiliary (M6 series)
G91-13(CA)	PICNICKING BOATING CAMPING with Arrow	Use Camping (Tent) (RM-010), Camping (Trailer) (RM-020), Picnic Area (RM-120), Motorboating (RW-070), Ramp (Launch) (RW-080), Rowboating (RW-090) or Sailboating (RW-100) with Directional Arrow Auxiliary (M6 series)

Table I-102(CA) Deleted California Signs - No Target Compliance Dates (Sheet 4 of 5)

California Code	Title/Description	Comment
G91-15(CA)	BOATING SKIING PICNICKING with Arrows	Use Skiing (Water) (RW-110), Picnic Area (RM-120), Motorboating (RW-070), Ramp (Launch) (RW-080), Rowboating (RW-090) or Sailboating (RW-100) with Directional Arrow Auxiliary (M6 series)
G91-17(CA)	PICNICKING NEXT RIGHT	Use Picnic Area (RM-120) with NEXT RIGHT/LEFT (G58(CA))
G91-19(CA)	CAMPGROUND 1/4 MILE	Use Camping (Tent) (RM-010) with Distance Ahead (W16-2 series and W16-3 series) plaques
G94-3(CA)	AIRPORT	Use Airport (I-5) or Conventional Airport (G94-1(CA))
G97A-2(CA)	CALTRAIN	Use AMTRAK (G97A(CA)) with CALTRAIN word message option
SG11(CA)	STATE FIRE STATION	Use CDF FIRE STATION NEXT RIGHT (SG38(CA))
SG12(CA)	STATE RANGER HDQTRS	Use Ranger Station (RG-170)
SG13(CA)	INTERMOUNTAIN CONSERVATION CAMP	Miscellaneous
SG36(CA)	BUCKLE UP with symbol	Use Seat Belt (SR15(CA)) symbol sign
SG37(CA)	HIGHWAY MAINTENANCE COURTESY OF ---	Use Adopt-A-Highway (S32(CA) series)
SG40(CA)	CALL BOX ___ MILE SPACING NEXT ___ MILES	Obsolete
SG46(CA)	MOTORIST AID CALL BOX AHEAD	Obsolete
SG49(CA)	CALL 511 TRAVEL INFO	Use TRAVEL INFO CALL 511 (D12-5)
S4-1.1(CA)	THIS FOUNTAIN HAS BEEN CONSTRUCTED...	Miscellaneous
S11-1(CA)	LITTER REMOVAL NEXT 2 MILES (with Plaque)	Use Adopt-A-Highway (S32(CA) series)
S11-2(CA)	WILDFLOWERS (with Plaque)	Use Adopt-A-Highway (S32(CA) series)
S11-3(CA)	TREE PLANTING (with Plaque)	Use Adopt-A-Highway (S32(CA) series)
S11A(CA)	ADOPT-A-HIGHWAY	Use Adopt-A-Highway (S32(CA) series)
S13(CA)	CARE FOR CALIFORNIA with Symbol	Campaign is over
S14(CA)	CARE FOR CALIFORNIA with Symbol	Campaign is over
S15(CA)	CARE FOR CALIFORNIA with Symbol	Campaign is over
S31(CA)	HIGHWAY WORKERS - GIVE 'EM A BRAKE	Miscellaneous
C10(CA)	SLIDE AHEAD	Use ROAD WORK, ROAD CLOSED, DETOUR, ONE LANE ROAD, RIGHT LANE CLOSED (W20 series) or NARROW LANES (C12(CA)), LANE CLOSED (C30(CA)), LANE CLOSED AHEAD (SC10(CA)), etc instead of identifying condition.
C13(CA)	END CONSTRUCTION	Use END ROAD WORK (G20-2)
C18(CA)	ROAD CONSTRUCTION AHEAD	Use ROAD (STREET) WORK (W20-1)
C21(CA)	SINGLE LANE AHEAD	Use RIGHT LANE CLOSED AHEAD (W20-5) or RIGHT TWO LANES CLOSED AHEAD (W20-5a)
C23A(CA)	ROAD WORK AHEAD (Square shape)	Use ROAD (STREET) WORK (W20-1)
C24A(CA)	SHOULDER WORK AHEAD (Square shape)	Use RIGHT (LEFT) SHOULDER CLOSED XXX FT (W21-5)

Table I-102(CA) Deleted California Signs - No Target Compliance Dates (Sheet 5 of 5)

California Code	Title/Description	Comment
<del>C32(CA)</del>	END SURVEY WORK	Use END ROAD WORK (G20-2)
<del>C33(CA)</del>	BLASTING ZONE 1000 FT	Use BLASTING ZONE AHEAD (W22-1)
<del>C36(CA)</del>	PREPARE TO STOP	Use BE PREPARED TO STOP (W3-4)
<del>C39(CA)</del>	ACCIDENT AHEAD	Use ROAD WORK, ROAD CLOSED, DETOUR, ONE LANE ROAD, RIGHT LANE CLOSED (W20 series) or NARROW LANES (C12(CA)), LANE CLOSED (C30(CA)), LANE CLOSED AHEAD (SC10(CA)), etc instead of identifying condition.
<del>C41(CA)</del>	Uneven Lane symbol	Use UNEVEN LANES (W8-11) word message sign
<del>C41A(CA)</del>	UNEVEN LANES (Rectangular)	Use UNEVEN LANES (W8-11) (Diamond) word message sign
<del>SC2-1(CA)</del>	ONE LANE ROAD	Use ONE LANE ROAD (W20-4)
<del>SC4(CA)</del>	SECOND RAMP CLOSED AHEAD	Use ___ EXIT - RAMP CLOSED (SC8(CA))
<del>SC6(CA)</del>	NOTICE - THIS RAMP WILL BE CLOSED TEMPORARILY - (Dates & Times)	Use RAMP CLOSED (More than one day) (SC6-4(CA))
<del>SC6-1(CA)</del>	ON (Day - Date - Time)	Use Day/Month Plaque (SC6A(CA)) or Time Plaque (SC6B(CA))
<del>SC6-2(CA)</del>	WEEKDAYS (Day - Date - Time)	Use Day/Month Plaque (SC6A(CA)) or Time Plaque (SC6B(CA))
<del>SC14(CA)</del>	RIGHT LANE	Use DETOUR (M4-9 series) or Directional Arrow Auxiliary (M6 series)
<del>SC17(CA)</del>	TRAFFIC BREAK DO NOT PASS	Use DO NOT PASS (SC13(CA))

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Table I-103(CA). Deleted MUTCD Signs - No Target Compliance Dates (Sheet 1 of 2)

MUTCD Code	California Code	Title of Sign	California MUTCD Section
M1-4	None	U.S. Route	2D.11, 2E.25
M1-5	None	State Route	2D.11
R1-6a	None	In-Street Pedestrian Crossing	2B.12
R2-2	None	Truck Speed Limit	2B.14
R2-5	None	Reduced Speed Ahead	Introduction, Page I-4
R3-1a	None	No Right Turn Across Tracks	8B.06, 10C.09
R3-2a	None	No Left Turn Across Tracks	8B.06, 10C.09
R3-9c	None	Reversible Lane Control	Introduction, Page I-4
R3-9e	None	Reversible Lane Control	Introduction, Page I-4
R3-10	None	Preferential Only Lane	2B.26, 2B.28
R3-10a	None	Preferential Only Lane	2B.26, 2B.28
R3-10b	None	Preferential Only Lane	2B.26, 2B.28
R3-11	None	Preferential Only Lane	2B.26, 2B.28
R3-11a	None	Preferential Only Lane	2B.26, 2B.28
R3-11b	None	Preferential Only Lane	2B.26, 2B.28
R3-11c	None	Preferential Only Lane	2B.26, 2B.28
R3-12	None	Preferential Only Lane	2B.26, 2B.28
R3-12a	None	Preferential Only Lane	2B.26, 2B.28
R3-12b	None	Preferential Only Lane	2B.26, 2B.28
R3-13	None	Preferential Only Lane	2B.26, 2B.28
R3-13a	None	Preferential Only Lane	2B.26, 2B.28
R3-14	None	Preferential Only Lane	2B.26, 2B.28
R3-14a	None	Preferential Only Lane	2B.26, 2B.28
R3-14b	None	Preferential Only Lane	2B.26, 2B.28
R3-15	None	Preferential Only Lane	2B.26, 2B.28
R3-15a	None	Preferential Only Lane	2B.26, 2B.28
R3-17	None	BIKE LANE	9B.04
R3-17a	None	AHEAD	9B.04
R3-17b	None	ENDS	9B.04
R10-6a	None	STOP HERE ON RED	2B.45
R10-11a	R13(CA)	NO TURN ON RED	2B.45
R10-11b	None	NO TURN ON RED	2B.45
R10-16	None	U-TURN YIELD TO RIGHT TURN	2B.45
R10-17a	None	RIGHT (LEFT) ON RED ARROW AFTER STOP	2B.45
R12-2	None	AXLE WEIGHT LIMIT X t (XX TONS)	2B.49
R12-3	None	NO TRUCKS OVER X t (XX TONS) EMPTY WT	2B.49
R12-4	None	WEIGHT LIMIT X t (XX TONS) PER AXLE, X t (XX TONS) GROSS	2B.49
R12-6	None	METRIC	2B.49
R14-2	None	Hazardous Material Route	2B.52
R14-3	None	Hazardous Material Prohibition	2B.52
R14-4	None	National Network	2B.53
R14-5	None	National Network Prohibition	2B.53
R15-3	None	EXEMPT	8B.05, 10C.10

Table I-103(CA). Deleted MUTCD Signs - No Target Compliance Dates (Sheet 2 of 2)

MUTCD Code	California Code	Title of Sign	California MUTCD Section
<del>W1-4b</del>	None	Reverse Curve (2 lanes)	6F.45
<del>W1-4c</del>	None	Reverse Curve (3 lanes)	6F.45
<del>W1-13a</del>	None	Truck Rollover Warning	Introduction, Page I-4
<del>W3-1a</del>	None	STOP AHEAD	2C.29
<del>W3-2a</del>	None	YIELD AHEAD	2C.29
<del>W4-1a</del>	None	Entering Roadway Merge	Introduction, Page I-4
<del>W5-4</del>	None	RAMP NARROWS	6F.26
<del>W6-1a</del>	None	DIVIDED HIGHWAY	2C.18
<del>W6-1b</del>	None	DIVIDED ROAD	2C.18
<del>W6-2a</del>	None	DIVIDED HIGHWAY ENDS	2C.19
<del>W6-2b</del>	None	DIVIDED ROAD ENDS	2C.19
<del>W9-2</del>	<del>W75(CA)</del>	LANE ENDS MERGE LEFT (RIGHT)	2C.33
<del>W10-6</del>	None	WARNING LOOK BOTH WAYS	Introduction, Page I-6
<del>W13-4</del>	None	ON RAMP	6F.25
<del>W13-5</del>	None	Curve Speed	2C.06, 2C.36
<del>W16-13p</del>	None	WHEN FLASHING	2C.29
<del>W20-7a</del>	None	Flagger	6F.29
<del>W24-1a</del>	None	Double Reverse Curve (2 lane)	6F.45
<del>W24-1b</del>	None	Double Reverse Curve (3 lane)	6F.45
<del>W25-1</del>	None	ONCOMING TRAFFIC HAS EXTENDED GREEN	2C.39
<del>W25-2</del>	None	ONCOMING TRAFFIC MAY HAVE EXTENDED GREEN	2C.39

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**CALIFORNIA MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES**  
~~MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES~~

**TABLE OF CONTENTS**

**INTRODUCTION**

**PART 1**

**GENERAL**

Chapter 1A

General

**PART 2**

**SIGNS**

Chapter 2A

General

Chapter 2B

Regulatory Signs

Chapter 2C

Warning Signs

Chapter 2D

Guide Signs – Conventional Roads

Chapter 2E

Guide Signs – Freeways and Expressways

Chapter 2F

Specific Service Signs

Chapter 2G

Tourist-Oriented Directional Signs (TODS)

Chapter 2H

Recreational and Cultural Interest Area Signs

Chapter 2I

Emergency Management Signing

**PART 3**

**MARKINGS**

Chapter 3A

General

Chapter 3B

Pavement and Curb Markings

Chapter 3C

Object Markers

Chapter 3D

Delineators

Chapter 3E

Colored Pavements

Chapter 3F

Barricades and Channelizing Devices

Chapter 3G

Islands

**PART 4**

**HIGHWAY TRAFFIC SIGNALS**

Chapter 4A

General

Chapter 4B

Traffic Control Signals - General

Chapter 4C

Traffic Control Signal Needs Studies

Chapter 4D

Traffic Control Signal Features

Chapter 4E

Pedestrian Control Features

Chapter 4F

Traffic Control Signals For Emergency Vehicle Access

Chapter 4G

Traffic Control Signals For One-Lane, Two-Way Facilities

Chapter 4H

Traffic Control Signals For Freeway Entrance Ramps

Chapter 4I

Traffic Control For Movable Bridges

Chapter 4J

Lane-Use Control Signals

Chapter 4K

Flashing Beacons

Chapter 4L

In-Roadway Lights



**PART 10**

**TRAFFIC CONTROLS FOR HIGHWAY-LIGHT RAIL  
TRANSIT GRADE CROSSINGS**

Chapter 10A

General

Chapter 10B

Highway-Light Rail Transit Grade Crossing Control Systems

Chapter 10C

Signs, Illumination, And Markings

Chapter 10D

Highway-Light Rail Transit Active Traffic Control Grade  
Crossing Systems

**APPENDIX**

Appendix A1

Congressional Legislation

[Appendix A101\(CA\)](#)

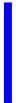
[California Sign Chart \(September 2006\)](#)

[Appendix A102\(CA\)](#)

[List of Acronyms & Abbreviations](#)

[Appendix A103\(CA\)](#)

[List of Useful TCD Related Web Sites](#)



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# California

# Manual on Uniform

# Traffic Control Devices

for Streets and Highways  
(FHWA's MUTCD 2003 Edition,  
as amended for use in California)

## PART 1

### General



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

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## PART 1. GENERAL

### TABLE OF CONTENTS

		<u>Page</u>
<b>CHAPTER 1A.</b>	<b>GENERAL</b>	
Section 1A.01	Purpose of Traffic Control Devices	1A-1
Section 1A.02	Principles of Traffic Control Devices	1A-1
Section 1A.03	Design of Traffic Control Devices	1A-1
Section 1A.04	Placement and Operation of Traffic Control Devices	1A-2
Section 1A.05	Maintenance of Traffic Control Devices	1A-2
Section 1A.06	Uniformity of Traffic Control Devices	1A-3
Section 1A.07	Responsibility for Traffic Control Devices	1A-3
Section 1A.08	Authority for Placement of Traffic Control Devices	1A-4
Section 1A.09	Engineering Study and Engineering Judgment	1A-5
Section 1A.10	Interpretations, Experimentations, Changes, and Interim Approvals	1A-5
Section 1A.11	Relation to Other Publications	1A-10
Section 1A.12	Color Code	1A-12
Section 1A.13	Definitions of Words and Phrases in This Manual	1A-12
Section 1A.14	Abbreviations Used on Traffic Control Devices	1A-19
 <b><u>FIGURES</u></b>		
<b>CHAPTER 1A.</b>	<b>GENERAL</b>	
Figure 1A-1	Example of Process for Requesting and Conducting Experimentations for New Traffic Control Devices	1A-20
Figure 1A-2	Example of Process for Incorporating New Traffic Control Devices into the MUTCD	1A-21
 <b><u>TABLES</u></b>		
<b>CHAPTER 1A.</b>	<b>GENERAL</b>	
Table 1A-1	Acceptable Abbreviations	1A-22
Table 1A-2	Abbreviations That Are Acceptable Only with a Prompt Word	1A-23
Table 1A-3	Unacceptable Abbreviations	1A-24

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## CHAPTER 1A. GENERAL

### **Section 1A.01 Purpose of Traffic Control Devices**

Support:

The purpose of traffic control devices, as well as the principles for their use, is to promote highway safety and efficiency by providing for the orderly movement of all road users on streets and highways throughout the Nation.

Traffic control devices notify road users of regulations and provide warning and guidance needed for the reasonably safe, uniform, and efficient operation of all elements of the traffic stream.

**Standard:**

**Traffic control devices or their supports shall not bear any advertising message or any other message that is not related to traffic control.**

Support:

Tourist-oriented directional signs and Specific Service signs are not considered advertising; rather, they are classified as motorist service signs.

### **Section 1A.02 Principles of Traffic Control Devices**

Support:

This Manual contains the basic principles that govern the design and use of traffic control devices for all streets and highways open to public travel regardless of type or class or the public agency having jurisdiction. This Manual's text specifies the restriction on the use of a device if it is intended for limited application or for a specific system. It is important that these principles be given primary consideration in the selection and application of each device.

Guidance:

To be effective, a traffic control device should meet five basic requirements:

- A. Fulfill a need;
- B. Command attention;
- C. Convey a clear, simple meaning;
- D. Command respect from road users; and
- E. Give adequate time for proper response.

Design, placement, operation, maintenance, and uniformity are aspects that should be carefully considered [by the engineer](#) in order to maximize the ability of a traffic control device to meet the five requirements listed in the previous paragraph. Vehicle speed [and geometrics](#) should be carefully considered as an element that governs the design, operation, placement, and location of various traffic control devices.

Support:

The definition of the word "speed" varies depending on its use. The definitions of specific speed terms are contained in Section 1A.13.

Guidance:

The actions required of road users to obey regulatory devices should be specified by State statute, or in cases not covered by State statute, by local ordinance or resolution consistent with the "Uniform Vehicle Code." The proper use of traffic control devices should provide the reasonable and prudent road user with the information necessary to reasonably safely and lawfully use the streets, highways, pedestrian facilities, and bikeways.

Support:

Uniformity of the meaning of traffic control devices is vital to their effectiveness. The meanings ascribed to devices in this Manual are in general accord with the publications mentioned in Section 1A.11.

### **Section 1A.03 Design of Traffic Control Devices**

Guidance:

Devices should be designed so that features such as size, shape, color, composition, lighting or retroreflection, and contrast are combined to draw attention to the devices; that size, shape, color, and simplicity of message combine to produce a clear meaning; that legibility and size combine with placement

to permit adequate time for response; and that uniformity, size, legibility, and reasonableness of the message combine to command respect.

**Standard:**

All symbols shall be unmistakably similar to or mirror images of the adopted symbol signs, all of which are shown in the "Standard Highway Signs" book (see Section 1A.11). Symbols and colors shall not be modified unless otherwise stated herein. All symbols and colors for signs not shown in the "Standard Highway Signs" book shall follow the procedures for experimentation and change described in Section 1A.10.

**Guidance:**

Aspects of a device's design should be modified only if there is a demonstrated need.

**Support:**

An example of modifying a device's design would be to modify the Side Road (W2-2) sign to show a second offset intersecting road.

**Standard:**

Except as noted in the Option below, highway agencies shall not develop word message signs. In accordance with CVC Section 21401, only word message signs conforming to Department of Transportation standards and specifications shall be placed on streets and highways.

**Option:**

~~Highway agencies may develop word message signs to notify road users of special regulations or to warn road users of a situation that might not be readily apparent. Unlike symbol signs and colors, new word message signs may be used without the need for experimentation.~~ Highway agencies may develop place/facility name or day, date, time portion of the word message on signs to notify road users of special events/circumstances or to warn road users of a situation that might not be readily apparent. Unlike symbol signs and colors, these place/facility name or day, date, time modified word message signs may be used without the need for experimentation. With the exception of symbols and colors, minor modifications in the specific design elements of a device may be made provided the essential appearance characteristics are preserved. Although the standard design of symbol signs cannot be modified, it may be appropriate to change the orientation of the symbol to better reflect the direction of travel.

### **Section 1A.04 Placement and Operation of Traffic Control Devices**

**Guidance:**

Placement of a traffic control device should be within the road user's view so that adequate visibility is provided. To aid in conveying the proper meaning, the traffic control device should be appropriately positioned with respect to the location, object, or situation to which it applies. The location and legibility of the traffic control device should be such that a road user has adequate time to make the proper response in both day and night conditions.

Traffic control devices should be placed and operated in a uniform and consistent manner.

Unnecessary traffic control devices should be removed. The fact that a device is in good physical condition should not be a basis for deferring needed removal or change.

Traffic control devices, which are used on a part-time basis, should be in operation only during the time periods that they are required.

### **Section 1A.05 Maintenance of Traffic Control Devices**

**Guidance:**

Functional maintenance of traffic control devices should be used to determine if certain devices need to be changed to meet current traffic conditions.

Physical maintenance of traffic control devices should be performed to retain the legibility and visibility of the device, and to retain the proper functioning of the device.

**Support:**

Clean, legible, properly mounted devices in good working condition command the respect of road users.

### **Section 1A.06 Uniformity of Traffic Control Devices**

**Support:**

Uniformity of devices simplifies the task of the road user because it aids in recognition and understanding, thereby reducing perception/reaction time. Uniformity assists road users, law enforcement officers, and traffic courts by giving everyone the same interpretation. Uniformity assists public highway officials through efficiency in manufacture, installation, maintenance, and administration. Uniformity means treating similar situations in a similar way. The use of uniform traffic control devices does not, in itself, constitute uniformity. A standard device used where it is not appropriate is as objectionable as a nonstandard device; in fact, this might be worse, because such misuse might result in disrespect at those locations where the device is needed and appropriate.

**Standard:**

Any given device for the control of traffic shall have the same meaning and require the same action on the part of motorists regardless of where it is encountered.

### **Section 1A.07 Responsibility for Traffic Control Devices**

**Standard:**

The responsibility for the design, placement, operation, maintenance, and uniformity of traffic control devices shall rest with the public agency or the official having jurisdiction. 23 CFR 655.603 adopts the Manual on Uniform Traffic Control Devices as the national standard for all traffic control devices installed on any street, highway, or bicycle trail open to public travel. When a State or other Federal agency manual or supplement is required, that manual or supplement shall be in substantial conformance with the national Manual on Uniform Traffic Control Devices.

This California MUTCD (including the incorporated FHWA's MUTCD) does not supersede the Department's Standard Plans, Standard Specifications or the Special Provisions publications. Nothing contained in the California MUTCD shall prevent the Department of Transportation from modifying, changing or adopting new specifications as necessary.

23 CFR 655.603 also states that traffic control devices on all streets and highways open to public travel in each State shall be in substantial conformance with standards issued or endorsed by the Federal Highway Administrator.

**Support:**

The "Uniform Vehicle Code" (see Section 1A.11) has the following provision in Section 15-104 for the adoption of a uniform Manual:

"(a)The [State Highway Agency] shall adopt a manual and specification for a uniform system of traffic control devices consistent with the provisions of this code for use upon highways within this State. Such uniform system shall correlate with and so far as possible conform to the system set forth in the most recent edition of the Manual on Uniform Traffic Control Devices for Streets and Highways, and other standards issued or endorsed by the Federal Highway Administrator."

"(b) The Manual adopted pursuant to subsection (a) shall have the force and effect of law."

Additionally, States are encouraged to adopt Section 15-116 of the "Uniform Vehicle Code," which states that, "No person shall install or maintain in any area of private property used by the public any sign, signal, marking or other device intended to regulate, warn, or guide traffic unless it conforms with the State manual and specifications adopted under Section 15-104."

**Support:**

Pursuant to the provisions in CVC Section 21400, the Department of Transportation adopts uniform standards and specifications for all traffic control devices after consultation with local agencies and public hearings. The Department of Transportation consults with local agencies and the public through the California Traffic Control Devices Committee (CTCDC). The Department of Transportation publicizes these uniform standards and specifications for traffic control devices through the California MUTCD.

**Standard:**

In accordance with CVC Section 21401, only traffic control devices conforming to Department of Transportation standards and specifications shall be placed on streets and highways.

Subject to the requirements in CVC Sections 21100, 21100.1, 21107, 21107.5, 21107.6, and 21107.7, no person shall install or maintain in any area of private property used by the public any sign, signal, or marking or other device intended to regulate, warn, or guide traffic unless it conforms with Department of Transportation standards and specifications.

Support:

The delegation of maintenance activities to local authorities is usually exercised under the authority of Streets and Highways Code Section 130.

The Department of Transportation standards and specifications for traffic control devices are not applicable to privately owned and maintained roads or commercial establishments, unless the particular city or county enacts an ordinance or resolution to this effect. Refer to CVC Sections 21100, 21100.1, 21107, 21107.5, 21107.6, and 21107.7. However, the use of Department of Transportation standards and specifications for traffic control devices are encouraged on all privately owned and maintained roads or commercial establishments, in general, as a good practice.

### **Section 1A.08 Authority for Placement of Traffic Control Devices**

**Standard:**

**Traffic control devices, advertisements, announcements, and other signs or messages within the highway right-of-way shall be placed only as authorized by a public authority or the official having jurisdiction, for the purpose of regulating, warning, or guiding traffic.**

**When the public agency or the official having jurisdiction over a street or highway has granted proper authority, others such as contractors and public utility companies shall be permitted to install temporary traffic control devices in temporary traffic control zones. Such traffic control devices shall conform with the Standards of this Manual.**

**This California MUTCD (including the incorporated FHWA's MUTCD) does not supersede the Department's Standard Plans, Standard Specifications or the Special Provisions publications. Nothing contained in the California MUTCD shall prevent the Department of Transportation from modifying, changing or adopting new specifications as necessary.**

Guidance:

Any unauthorized traffic control device or other sign or message placed on the highway right-of-way by a private organization or individual constitutes a public nuisance and should be removed. All unofficial or nonessential traffic control devices, signs, or messages should be removed.

**Standard:**

**All regulatory traffic control devices shall be supported by laws, ordinances, or regulations.**

Support:

Provisions of this Manual are based upon the concept that effective traffic control depends upon both appropriate application of the devices and reasonable enforcement of the regulations.

California Vehicle Code (CVC) references are used throughout this California MUTCD when the subject matter relates to State law.

**Standard:**

**CVC 21400 provides that the Department of Transportation shall, after consultation with local agencies and public hearings, adopt rules and regulations prescribing uniform standards and specifications for all official traffic control devices placed pursuant to the provisions of the Code.**

**CVC 21401 provides that only those official traffic control devices that conform to the uniform standards and specifications promulgated by the Department of Transportation shall be placed upon a street or highway.**

**CVC 21350 and 21351 give basic authority to the Department of Transportation and local authorities, in their respective jurisdictions, to place and maintain such official traffic control devices.**

Option:

Local authorities may adopt rules and regulations by ordinance or resolution for regulating traffic by means of official traffic control devices meeting the requirements of CVC Section 21400. Refer to CVC Section 21100 (d).

**Standard:**

**The use of unauthorized traffic control devices is prohibited by CVC 21465. Prohibited traffic control devices constitute a public nuisance and shall be removed per CVC 21467. This does not modify or limit the**

authority of the Public Utilities Commission to erect or maintain traffic control devices as authorized by law. Refer to CVC 21468.

Private advertising is prohibited on any highway right-of-way by Section 5403 (a) of the Business and Professions Code. "Highway" in this context includes roads, streets, boulevards, lanes, courts, places, commons, trails, ways or other rights-of-way or easements used for or laid out and intended for the public passage of vehicles or of vehicles and persons per Section 5213 of the Business and Professions Code.

Support:

The California Public Utilities Commission is the state regulatory agency with statutory authority over highway-rail grade crossings and highway-light rail transit grade crossings. Refer to Public Utilities Code Section 1202(a).

### **Section 1A.09 Engineering Study and Engineering Judgment**

**Standard:**

**This Manual describes the application of traffic control devices, but shall not be a legal requirement for their installation.**

Guidance:

The decision to use a particular device at a particular location should be made on the basis of either an engineering study or the application of engineering judgment. Thus, while this Manual provides Standards, Guidance, and Options for design and application of traffic control devices, this Manual should not be considered a substitute for engineering judgment.

Engineering judgment should be exercised in the selection, ~~and~~ application and replacement of traffic control devices, as well as in the location and design of the roads and streets that the devices complement. Jurisdictions with responsibility for traffic control that do not have engineers on their staffs should seek engineering assistance from others, such as the State transportation agency, their County, a nearby large City, or a traffic engineering consultant.

Support:

Refer to CVC 627 for definition and requirements of "Engineering and Traffic Survey". It is also abbreviated in this manual as E&TS.

### **Section 1A.10 Interpretations, Experimentations, Changes, and Interim Approvals**

**Standard:**

**Design, application, and placement of traffic control devices other than those adopted in this Manual shall be prohibited unless the provisions of this Section are followed.**

Support:

Continuing advances in technology will produce changes in the highway, vehicle, and road user proficiency; therefore, portions of the system of traffic control devices in this Manual will require updating. In addition, unique situations often arise for device applications that might require interpretation or clarification of this Manual. It is important to have a procedure for recognizing these developments and for introducing new ideas and modifications into the system.

**Standard:**

**Requests for any interpretation, permission to experiment, interim approval, or change to FHWA's MUTCD shall be sent to the Federal Highway Administration (FHWA), Office of Transportation Operations, 400 Seventh Street, SW, HOTO, Washington, DC 20590.**

Support:

Requests for experimentation, interpretation, or changes relating to the California edited portion of the California MUTCD are covered later in this section.

An interpretation includes a consideration of the application and operation of standard traffic control devices, official meanings of standard traffic control devices, or the variations from standard device designs.

Guidance:

Requests for an interpretation of this Manual should contain the following information:

- A. A concise statement of the interpretation being sought;
- B. A description of the condition that provoked the need for an interpretation;
- C. Any illustration that would be helpful to understand the request; and

D. Any supporting research data that is pertinent to the item to be interpreted.

Support:

Requests to experiment include consideration of field deployment for the purpose of testing or evaluating a new traffic control device, its application or manner of use, or a provision not specifically described in this Manual.

A request for permission to experiment will be considered only when submitted by the public agency or private toll facility responsible for the operation of the road or street on which the experiment is to take place.

A diagram indicating the process for experimenting with traffic control devices is shown in Figure 1A-1.

Guidance:

The request for permission to experiment should contain the following:

- A. A statement indicating the nature of the problem.
- B. A description of the proposed change to the traffic control device or application of the traffic control device, how it was developed, the manner in which it deviates from the standard, and how it is expected to be an improvement over existing standards.
- C. Any illustration that would be helpful to understand the traffic control device or use of the traffic control device.
- D. Any supporting data explaining how the traffic control device was developed, if it has been tried, in what ways it was found to be adequate or inadequate, and how this choice of device or application was derived.
- E. A legally binding statement certifying that the concept of the traffic control device is not protected by a patent or copyright. (An example of a traffic control device concept would be countdown pedestrian signals in general. Ordinarily an entire general concept would not be patented or copyrighted, but if it were it would not be acceptable for experimentation unless the patent or copyright owner signs a waiver of rights acceptable to the FHWA. An example of a patented or copyrighted specific device within the general concept of countdown pedestrian signals would be a manufacturer's design for its specific brand of countdown signal, including the design details of the housing or electronics that are unique to that manufacturer's product. As long as the general concept is not patented or copyrighted, it is acceptable for experimentation to incorporate the use of one or more patented devices of one or several manufacturers.)
- F. The time period and location(s) of the experiment.
- G. A detailed research or evaluation plan that must provide for close monitoring of the experimentation, especially in the early stages of its field implementation. The evaluation plan should include before and after studies as well as quantitative data describing the performance of the experimental device.
- H. An agreement to restore the site of the experiment to a condition that complies with the provisions of this Manual within 3 months following the end of the time period of the experiment. This agreement must also provide that the agency sponsoring the experimentation will terminate the experimentation at any time that it determines significant safety concerns are directly or indirectly attributable to the experimentation. The FHWA's Office of Transportation Operations has the right to terminate approval of the experimentation at any time if there is an indication of safety concerns. If, as a result of the experimentation, a request is made that this Manual be changed to include the device or application being experimented with, the device or application will be permitted to remain in place until an official rulemaking action has occurred.
- I. An agreement to provide semiannual progress reports for the duration of the experimentation, and an agreement to provide a copy of the final results of the experimentation to the FHWA's Office of Transportation Operations within 3 months following completion of the experimentation. The FHWA's Office of Transportation Operations has the right to terminate approval of the experimentation if reports are not provided in accordance with this schedule.

Support:

A change includes consideration of a new device to replace a present standard device, an additional device to be added to the list of standard devices, or a revision to a traffic control device application or placement criteria.

**Guidance:**

Requests for a change to this Manual should contain the following information:

- A. A statement indicating what change is proposed;
- B. Any illustration that would be helpful to understand the request; and
- C. Any supporting research data that is pertinent to the item to be reviewed.

**Support:**

Requests for interim approval include consideration of allowing interim use, pending official rulemaking, of a new traffic control device, a revision to the application or manner of use of an existing traffic control device, or a provision not specifically described in this Manual. If granted, interim approval will result in the traffic control device or application being placed into the next scheduled rulemaking process for revisions to this Manual. The device or application will be permitted to remain in place, under any conditions established in the interim approval, until an official rulemaking action has occurred.

Interim approval is considered based on the results of successful experimentation, results of analytical or laboratory studies, and/or review of non-U.S. experience with a traffic control device or application. Interim approval considerations include an assessment of relative risks, benefits, and costs. Interim approval includes conditions that jurisdictions agree to comply with in order to use the traffic control device or application until an official rulemaking action has occurred.

**Guidance:**

The request for permission to place a traffic control device under interim approval should contain the following:

- A. A statement indicating the nature of the problem.
- B. A description of the proposed change to the traffic control device or application of the traffic control device, how it was developed, the manner in which it deviates from the standard, and how it is expected to be an improvement over existing standards.
- C. The location(s) where it will be used and any illustration that would be helpful to understand the traffic control device or use of the traffic control device.
- D. A legally-binding statement certifying that the concept of the traffic control device is not protected by a patent or copyright. (An example of a traffic control device concept would be countdown pedestrian signals in general. Ordinarily an entire general concept would not be patented or copyrighted, but if it were it would not be acceptable for interim approval unless the patent or copyright owner signs a waiver of rights acceptable to the FHWA. An example of a patented or copyrighted specific device within the general concept of countdown pedestrian signals would be a manufacturer's design for its specific brand of countdown signal, including the design details of the housing or electronics that are unique to that manufacturer's product. Interim approval of a specific patented or copyrighted product is not acceptable.)
- E. A detailed completed research or evaluation on this traffic control device.
- F. An agreement to restore the site(s) of the interim approval to a condition that complies with the provisions in this Manual within 3 months following the issuance of a final rule on this traffic control device. This agreement must also provide that the agency sponsoring the interim approval will terminate use of the device or application installed under the interim approval at any time that it determines significant safety concerns are directly or indirectly attributable to the device or application. The FHWA's Office of Transportation Operations has the right to terminate the interim approval at any time if there is an indication of safety concerns.

**Option:**

A State may submit a request for interim approval for all jurisdictions in that State, as long as the request contains the information listed in the Guidance above.

**Standard:**

**Once an interim approval is granted to any jurisdiction for a particular traffic control device or application, subsequent jurisdictions shall be granted interim approval for that device or application by submitting a letter to the FHWA Office of Transportation Operations indicating they will abide by Item F above and the specific conditions contained in the original interim approval.**

**A local jurisdiction using a traffic control device or application under an interim approval that was granted either directly to that jurisdiction or on a statewide basis based on the State's request shall inform the State of the locations of such use.**

Support:

A diagram indicating the process for incorporating new traffic control devices into this Manual is shown in Figure 1A-2.

Procedures for revising this Manual are set out in the Federal Register of June 30, 1983 (48 FR 30145).

For additional information concerning interpretations, experimentation, changes, or interim approvals, write to the FHWA, 400 Seventh Street, SW, HOTO, Washington, DC 20590, or visit the MUTCD website at <http://mutcd.fhwa.dot.gov>.

**Standard:**

**Requests shall be made to the FHWA for experimenting with any new traffic control device, its application or manner of use, or a provision not specifically described in the Manual on Uniform Traffic Control Devices.**

Support:

In addition to the requirements of the FHWA, experimental traffic control devices are subject to the laws, regulations and policies of the State of California. Informing the Department of Transportation is necessary prior to installation and experimentation on public travelways in California for any FHWA permission to experiment. For information, contact:

Secretary,  
California Traffic Control Devices Committee  
(916) 654-4715.

The California MUTCD contains the official standards and policies of the State of California for the design, application, and placement of traffic control devices.

Experimentation is defined as research involving the acts of testing, evaluating, analyzing or discovering the effect of a specific device, principle, supposition, etc., usually carried out in an operational context. Experimentation could also be performed in a laboratory. The request for experimentation is a submission specifically requesting approval to use a non-standard device on public roadways for purposes of gathering verification data.

As used herein, the term "device" includes not only signs, signals, and markings, but also their application and manner of use.

Guidance:

Requests for experimentation, interpretation, or changes relating to the California edited portion of the California MUTCD should be sent to:

Secretary,  
California Traffic Control Devices Committee – MS36  
P.O. Box 942874, Sacramento, CA-94274-0001

The following procedures apply to requests for experimentation:

### **Submission of Projects**

Guidance:

A request for permission to experiment will be considered only when submitted by the public agency or private toll facility responsible for the operation of the road or street on which the experiment is to take place.

Experimentation requests should contain the following information:

1. A statement indicating the nature of the problem.
2. A description of the proposed change, how it was developed, the manner in which it deviates from the standard, and how it is expected to be an improvement over existing standards.
3. Any illustration, photograph, or videos, which would help, explain the experimental device or use of this device.
4. Any supporting data as to how the experimental device was developed, if it has been tried, in what ways it was found to be adequate or inadequate, and how was this choice of device or application arrived at.

Requests for experimentation that are submitted without an explanation of the objective, scope, and duration will be returned to the originator for amplification.

### Procedure for Processing Requests

#### Support:

- A. All requests for experimentation will be reviewed by the Secretary of the California Traffic Control Devices Committee to determine whether other related experimentation has been scheduled, in process, or already completed.
- B. The Secretary of the California Traffic Control Devices Committee will list the experimentation proposal on the next Committee agenda for review and approval. The Committee's approval would also include the specific guidelines to be followed for the experimentation.
- C. Action by the California Traffic Control Devices Committee on any request for experimental use of a non-conforming device could take several forms:
  1. Approval of the device for limited use on an experimental project.
  2. Approval of the device for limited use in a formal research project.
  3. Disapproval until such time as satisfactory research or other justification is submitted.
  4. Disapproval.
- D. After action by the California Traffic Control Devices Committee, the Secretary of the California Traffic Control Devices Committee will notify the originating party of its decision. If approved, the originating parties will be requested to submit a status report on the experimental testing at appropriate intervals. When the results of experimentation are completed, a final report will be prepared and forwarded to the Secretary for Committee review.
- E. The agency receiving approval for experimentation must agree to faithfully follow the specific guidelines for the experimentation, must forward reports as indicated, and must agree to terminate the experimentation upon notification.

### Specific Guidelines for Experimental Proposal

#### Guidance:

A specific proposal should be submitted for each request.

#### Support:

This proposal can be submitted with the initial request or could be a follow-up to specific comments by the California Traffic Control Devices Committee. The proposal, after approval by the Committee, will become an integral part of the approved experimentation.

#### Guidance:

Each proposal should include:

- A. Scope: A detailed description of the experimentation, locations of installation, and number of experimental projects.
- B. Work Plan: A description of the proposed plan of study; the variables that are to be measured; the criteria against which the devices is to be evaluated; observations, measures and data which will be collected; whether the experimentation will be carried out in the field or under laboratory conditions; how installations of the experimental device or application will be made; the indication if any adverse effects on safety or traffic operations can be anticipated, together with the means that may be taken to minimize them; and the factors which will be held constant or measured and controlled in order to ensure that the true effects of the device are measured.
- C. Time Periods: Time periods for experimentation will normally not be less than six months nor more than two years.
- D. Evaluation Procedures: The California Traffic Control Devices Committee will approve criteria, which will be used to evaluate experimental devices or applications. To permit meaningful comparisons with standard installations, advice from specialists such as human factor experts, statisticians, etc., could be included.
- E. Reporting: A written status report must be forwarded to the sponsor 45 days prior to each public meeting. A final report must be completed within 90 days of the terminal date of the experimentation and forwarded to the Secretary of the California Traffic Control Devices Committee. Status reports will describe the progress of the work, any particular deviation from the work plan and anticipated time of conclusion. The final report will contain, as a minimum, the basic information on the problem, the preliminary investigations, the proposed solutions, the study procedures, the detailed analysis of the data, the results of the work, a discussion of the

results, and whatever conclusions are drawn. If a change in the California MUTCD is proposed, the recommended text (wording) for the California MUTCD should be included.

- F. Administration: All experimentation proposals will include the agency sponsoring the study, the agency conducting the study, and the name and titles of principal researchers. There must be proof of professional traffic engineering capabilities and other related professional expertise to perform the experimentation and related evaluation processes.

#### Termination of Experimentation

##### Standard:

The project shall terminate at the end of the approved period unless an extension is granted, and all experimental devices and applications shall be removed unless specific permission is given for continued operation.

##### Support:

The California Traffic Control Devices Committee could, at any time, terminate approval of experimentation if significant safety hazards are indicated to be directly or indirectly attributable to the experimentation. Approval of any experimentation could also be terminated if no status report is received 45 days prior to each public meeting or no final report is received within 90 days of the terminal date of the experimentation.

#### Removal of Experimentation Installations

##### Standard:

All experimentation installations shall be removed upon termination of the experiment-when a decision is made by the California Traffic Control Devices Committee that the device is not warranted.

##### Support:

Authority and reference cited for removal of experimentation installation is CVC Section 21400.

### **Section 1A.11 Relation to Other Publications**

#### **Standard:**

**To the extent that they are incorporated by specific reference, the latest editions of the following publications, or those editions specifically noted, shall be a part of this Manual: “Standard Highway Signs” book (FHWA); and “Color Specifications for Retroreflective Sign and Pavement Marking Materials” (appendix to subpart F of Part 655 of Title 23 of the Code of Federal Regulations).**

#### Support:

The “Standard Highway Signs” book includes standard alphabets and symbols for highway signs and pavement markings.

For information about the above publications, visit the Federal Highway Administration’s MUTCD website at <http://mutcd.fhwa.dot.gov>, or write to the FHWA, 400 Seventh Street, SW, HOTO, Washington, DC 20590.

The publication entitled “Federal-Aid Highway Program Guidance on High Occupancy Vehicle (HOV) Lanes” is available at <http://www.fhwa.dot.gov/operations/hovguide01.htm>, or write to the FHWA, 400 Seventh Street, SW, HOTM, Washington, DC 20590.

Other publications that are useful sources of information with respect to use of this Manual are listed below. See Page i of this Manual for ordering information for the following publications:

1. “A Policy on Geometric Design of Highways and Streets,” 2001 Edition (American Association of State Highway and Transportation Officials—AASHTO)
2. “Guide for the Development of Bicycle Facilities,” 1999 Edition (AASHTO)
3. “Guide to Metric Conversion,” 1993 Edition (AASHTO)
4. “Guidelines for the Selection of Supplemental Guide Signs for Traffic Generators Adjacent to Freeways,” 2001 Edition (AASHTO)
5. “List of Control Cities for Use in Guide Signs on Interstate Highways,” 2001 Edition (AASHTO)
6. “Roadside Design Guide,” 2001 Edition (AASHTO)
7. “Standard Specifications for Movable Highway Bridges,” 1988 Edition (AASHTO)
8. “Traffic Engineering Metric Conversion Folders— Addendum to the Guide to Metric Conversion,” 1993 Edition (AASHTO)

9. "2000 AREMA Communications & Signals Manual," American Railway Engineering & Maintenance-of-Way Association (AREMA)
10. "Designing Sidewalks and Trails for Access—Part 2—Best Practices Design Guide," 2001 Edition (FHWA) [Publication No. FHWA-EP-01-027]
11. "Practice for Roadway Lighting," RP-8, 2001, Illuminating Engineering Society (IES)
12. "Safety Guide for the Prevention of Radio Frequency Radiation Hazards in the Use of Commercial Electric Detonators (Blasting Caps)," Safety Library Publication No. 20, Institute of Makers of Explosives
13. "American National Standard for High-Visibility Safety Apparel," (ANSI/ISEA 107-1999), 1999 Edition, ISEA - The Safety Equipment Association.
14. "Manual of Traffic Signal Design," 1998 Edition (Institute of Transportation Engineers—ITE)
15. "Manual of Transportation Engineering Studies," 1994 Edition (ITE)
16. "Pedestrian Traffic Control Signal Indications," 1985 Edition (ITE)
17. "Preemption of Traffic Signals at or Near Railroad Grade Crossings with Active Warning Devices," (ITE)
18. "Purchase Specification for Flashing and Steady Burn Warning Lights," 1981 Edition (ITE)
19. "School Trip Safety Program Guidelines," 1984 Edition (ITE)
20. "Traffic Detector Handbook," 1991 Edition (ITE)
21. "Traffic Engineering Handbook," 1999 Edition (ITE)
22. "Traffic Signal Lamps," 1980 Edition (ITE)
23. "Traffic Control Devices Handbook," 2001 Edition (ITE)
24. "Vehicle Traffic Control Signal Heads," Part 1—1985 Edition; Part 2—1998 Edition (ITE)
25. "Uniform Vehicle Code (UVC) and Model Traffic Ordinance," 2000 Edition (National Committee on Uniform Traffic Laws and Ordinances)
26. "Occupational Safety and Health Administration Regulations (Standards - 29 CFR), General Safety and Health Provisions - 1926.20," amended June 30, 1993, Occupational Safety and Health Administration (OSHA)
27. "Highway Capacity Manual," 2000 Edition (Transportation Research Board—TRB)
28. "Recommended Procedures for the Safety Performance Evaluation of Highway Features," (NCHRP Report 350), 1993 Edition (Transportation Research Board - TRB)
29. "Accessible Pedestrian Signals," A-37, 1998 Edition, U.S. Architectural and Transportation Barriers Compliance Board (The U.S. Access Board)
30. "Building a True Community—Final Report—Public Rights-of-Way Access Advisory Committee (PRWAAC)," 2001 Edition (The U.S. Access Board)
31. "The Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)," July 1998 Edition (The U.S. Access Board)
32. "Highway-Rail Intersection Architecture," U.S. Department of Transportation, Federal Railroad Administration (USDOT/FRA)

**Standard:**

The latest edition of Department of Transportation's California Sign Specifications shall be a part of this manual.

**Support:**

The latest version of other documents that are useful sources of information with respect to the use of this Manual are listed below. See Appendix for a list of web sites that have direct access to some of these publications. See the Introduction Part of this California MUTCD for ordering information for the following publications:

- A. "California Building Standards Code" 2001 Edition (California Building Standards Commission)
- B. "California Business and Professions Code" (State of California)
- C. "California Code of Regulations" (State of California)
- D. "California Education Code" (State of California)
- E. "California Government Code" (State of California)
- F. "California Health and Safety Code" (State of California)
- G. "California Streets and Highways Code" (State of California)

- H. "California Vehicle Code" (CVC), 2006 Edition (Department of Motor Vehicles)
- I. "Construction Manual", 2005 Edition. (Department of Transportation)
- J. "Highway Design Handbook For Older Drivers And Pedestrians", 2001 Edition (Federal Highway Administration)
- K. "Highway Design Manual", Fifth Edition (Department of Transportation)
- L. "High-Occupancy Vehicle Guidelines", 2003 Edition (Department of Transportation)
- M. "Historic Highway Bridges of California", (Department of Transportation)
- N. "Maintenance Manual", 1999 Edition (Department of Transportation)
- O. "Manual for Encroachment Permits on California State Highways", 2005 Edition (Department of Transportation)
- P. "Plans, Specifications and Estimates Guide" (PS&E), 2006 Edition (Department of Transportation)
- Q. "Project Development Procedures Manual", 2005 Edition (Department of Transportation)
- R. "Ramp Meter Design Manual", 2000 Edition (Department of Transportation)
- S. "Signal and Lighting Design Guide", 1995 Edition (Department of Transportation)
- T. "Standard Plans", 2006 Edition (Department of Transportation)
- U. "Standard Specifications", 2006 Edition (Department of Transportation)
- V. "Standard Special Provisions", 2006 Edition (Department of Transportation)
- W. "Traffic Control Devices Handbook", 2001 Edition (Institute of Transportation Engineers – ITE)
- X. "Traffic Engineering Metric Conversion Factors", 1993 Edition (American Association of State Highway and transportation Officials - AASHTO).
- Y. "Traffic Manual", 1996 Edition (Department of Transportation)

### **Section 1A.12 Color Code**

#### **Support:**

The following color code establishes general meanings for 10 colors of a total of 13 colors that have been identified as being appropriate for use in conveying traffic control information. Central values and tolerance limits for each color are available from the Federal Highway Administration, 400 Seventh Street, SW, HOTO, Washington, DC 20590, and at FHWA's MUTCD website at <http://mutcd.fhwa.dot.gov>.

The three colors for which general meanings have not yet been assigned are being reserved for future applications that will be determined only by FHWA after consultation with the States, the engineering community, and the general public. The meanings described in this Section are of a general nature. More specific assignments of colors are given in the individual Parts of this Manual relating to each class of devices.

#### **Standard:**

**The general meaning of the 13 colors shall be as follows:**

- A. Black—regulation**
- B. Blue—road user services guidance, tourist information, and evacuation route**
- C. Brown—recreational and cultural interest area guidance**
- D. Coral—unassigned**
- E. Fluorescent Pink—incident management**
- F. Fluorescent Yellow-Green—pedestrian warning, bicycle warning, playground warning, school bus and school warning**
- G. Green—indicated movements permitted, direction guidance**
- H. Light Blue—unassigned**
- I. Orange—temporary traffic control**
- J. Purple—unassigned**
- K. Red—stop or prohibition**
- L. White—regulation**
- M. Yellow—warning**

### **Section 1A.13 Definitions of Words and Phrases in This Manual**

#### **Standard:**

Unless otherwise defined herein, or in the other Parts of this Manual, definitions contained in the most recent edition of the "Uniform Vehicle Code," "AASHTO Transportation Glossary (Highway

Definitions),” [“California Vehicle Code”](#) and other publications specified in Section 1A.11 are also incorporated and adopted by reference.

The following words and phrases, when used in this Manual, shall have the following meanings:

1. **Active Grade Crossing Warning System**—the flashing-light signals, with or without warning gates, together with the necessary control equipment used to inform road users of the approach or presence of trains at highway-rail or highway-light rail transit grade crossings.
2. **Approach**—all lanes of traffic moving towards an intersection or a midblock location from one direction, including any adjacent parking lane(s).
3. **Arterial Highway (Street)**—a general term denoting a highway primarily used by through traffic, usually on a continuous route or a highway designated as part of an arterial system.
4. **Average Day**—a day representing traffic volumes normally and repeatedly found at a location. Where volumes are primarily influenced by employment, the average day is typically a weekday. When volumes are primarily influenced by entertainment or recreation, the average day is typically a weekend day.
5. **Beacon**—a highway traffic signal with one or more signal sections that operates in a flashing mode.
6. **Bicycle**—a pedal-powered vehicle upon which the human operator sits.
7. **Bicycle Lane**—a portion of a roadway that has been designated by signs and pavement markings for preferential or exclusive use by bicyclists.
- 7A. **CVC – California Vehicle Code.**
- 7B. **California Sign Specifications – Detailed drawings of signs approved by the Department of Transportation for use in California.**
8. **Centerline Markings**—the yellow pavement marking line(s) that delineates the separation of traffic lanes that have opposite directions of travel on a roadway. These markings need not be at the geometrical center of the pavement.
9. **Changeable Message Sign**—a sign that is capable of displaying more than one message, changeable manually, by remote control, or by automatic control. These signs are referred to as Dynamic Message Signs in the National Intelligent Transportation Systems (ITS) Architecture.
10. **Channelizing Line Marking**—a wide or double solid white line used to form islands where traffic in the same direction of travel is permitted on both sides of the island.
11. **Circular Intersection**—an intersection that has an island, generally circular in design, located in the center of the intersection where traffic passes to the right of the island. Circular intersections include roundabouts, rotaries, and traffic circles.
12. **Clear Zone**—the total roadside border area, starting at the edge of the traveled way, that is available for an errant driver to stop or regain control of a vehicle. This area might consist of a shoulder, a recoverable slope, and/or a nonrecoverable, traversable slope with a clear run-out area at its toe.
13. **Concurrent Flow HOV Lane**—an HOV lane that is operated in the same direction as the adjacent mixed flow lanes, separated from the adjacent general purpose freeway lanes by a standard lane stripe, painted buffer, or barrier.
14. **Contraflow Lane**—a lane operating in a direction opposite to the normal flow of traffic designated for peak direction of travel during at least a portion of the day. Contraflow lanes are usually separated from the off-peak direction lanes by plastic pylons, or by moveable or permanent barrier.
15. **Conventional Road**—a street or highway other than a low-volume road (as defined in Section 5A.01), expressway, or freeway.
16. **Collector Highway**—a term denoting a highway that in rural areas connects small towns and local highways to arterial highways, and in urban areas provides land access and traffic circulation within residential, commercial, and business areas and connects local highways to the arterial highways.
17. **Crashworthy**—a characteristic of a roadside appurtenance that has been successfully crash tested in accordance with a national standard such as the National Cooperative Highway

**Research Program Report 350, "Recommended Procedures for the Safety Performance Evaluation of Highway Features."**

18. **Crosswalk**—(a) that part of a roadway at an intersection included within the connections of the lateral lines of the sidewalks on opposite sides of the highway measured from the curbs or in the absence of curbs, from the edges of the traversable roadway, and in the absence of a sidewalk on one side of the roadway, the part of a roadway included within the extension of the lateral lines of the sidewalk at right angles to the centerline; (b) any portion of a roadway at an intersection or elsewhere distinctly indicated as a pedestrian crossing by lines on the surface, which may be supplemented by contrasting pavement texture, style, or color.
19. **Crosswalk Lines**—white pavement marking lines that identify a crosswalk.
20. **Delineator**—a retroreflective device mounted on the roadway surface or at the side of the roadway in a series to indicate the alignment of the roadway, especially at night or in adverse weather.
- 20A. **Department of Transportation – California Department of Transportation or Caltrans.**
21. **Detectable**—having a continuous edge within 150 mm (6 in) of the surface so that pedestrians who have visual disabilities can sense its presence and receive usable guidance information.
- 21A. **Divided Highway – A highway with separated roadbeds for traffic in opposing directions.**
22. **Dynamic Envelope**—the clearance required for the train and its cargo overhang due to any combination of loading, lateral motion, or suspension failure.
23. **Edge Line Markings**—white or yellow pavement marking lines that delineate the right or left edge(s) of a traveled way.
24. **End-of-Roadway Marker**—a device used to warn and alert road users of the end of a roadway in other than temporary traffic control zones.
25. **Engineering Judgment**—the evaluation of available pertinent information, and the application of appropriate principles, [experience](#), [education](#), [discretion](#), Standards, Guidance, and practices as contained in this Manual and other sources, for the purpose of deciding upon the applicability, design, operation, or installation of a traffic control device. Engineering judgment shall be exercised by an engineer, or by an individual working under the supervision of an engineer, through the application of procedures and criteria established by the engineer. Documentation of engineering judgment is not required.
26. **Engineering Study**—the comprehensive analysis and evaluation of available pertinent information, and the application of appropriate principles, [engineering judgment](#), [experience](#), [education](#), [discretion](#), Standards, Guidance, and practices as contained in this Manual and other sources, for the purpose of deciding upon the applicability, design, operation, or installation of a traffic control device. An engineering study shall be performed by an engineer, or by an individual working under the supervision of an engineer, through the application of procedures and criteria established by the engineer. An engineering study shall be documented.
27. **Expressway**—a divided highway with partial control of access.
28. **Flashing**—an operation in which a signal indication is turned on and off repetitively.
29. **Freeway**—a divided highway with full control of access.
30. **Guide Sign**—a sign that shows route designations, destinations, directions, distances, services, points of interest, or other geographical, recreational, or cultural information.
31. **High Occupancy Vehicle (HOV)**—a motor vehicle carrying at least two or more persons, including carpools, vanpools, and buses.
32. **Highway**—a general term for denoting a public way for purposes of travel by vehicular travel, including the entire area within the right-of-way.
33. **Highway-Rail Grade Crossing**—the general area where a highway and a railroad's right-of-way cross at the same level, within which are included the railroad tracks, highway, and traffic control devices for highway traffic traversing that area.
34. **Highway Traffic Signal**—a power-operated traffic control device by which traffic is warned or directed to take some specific action. These devices do not include signals at toll plazas, power

- operated signs, illuminated pavement markers, warning lights (see Section 6F.78), or steady burning electric lamps.
35. **HOV Lane**—any preferential lane designated for exclusive use by high-occupancy vehicles for all or part of a day—including a designated lane on a freeway, other highway, street, or independent roadway on a separate right-of-way.
  36. **Inherently Low Emission Vehicle (ILEV)**—any kind of vehicle that is certified by the U.S. Environmental Protection Agency and that because of inherent properties of the fuel system design, will not have significant evaporative emissions, even if its evaporative emission control system has failed.
  37. **Interchange**—a system of interconnecting roadways providing for traffic movement between two or more highways that do not intersect at grade.
  38. **Intermediate Interchange**—an interchange with an urban or rural route that is not a major or minor interchange as defined herein.
  39. **Intersection**—(a) the area embraced within the prolongation or connection of the lateral curb lines, or if none, the lateral boundary lines of the roadways of two highways that join one another at, or approximately at, right angles, or the area within which vehicles traveling on different highways that join at any other angle might come into conflict; (b) the junction of an alley or driveway with a roadway or highway shall not constitute an intersection.
  40. **Island**—a defined area between traffic lanes for control of vehicular movements or for pedestrian refuge. It includes all end protection and approach treatments. Within an intersection area, a median or an outer separation is considered to be an island.
  41. **Lane Line Markings**—white pavement marking lines that delineate the separation of traffic lanes that have the same direction of travel on a roadway.
  42. **Lane-Use Control Signal**—a signal face displaying indications to permit or prohibit the use of specific lanes of a roadway or to indicate the impending prohibition of such use.
  43. **Legend**—see Sign Legend.
  44. **Logo**—a distinctive emblem, symbol, or trademark that identifies a product or service.
  45. **Longitudinal Markings**—pavement markings that are generally placed parallel and adjacent to the flow of traffic such as lane lines, centerlines, edge lines, channelizing lines, and others.
  46. **Major Interchange**—an interchange with another freeway or expressway, or an interchange with a high-volume multi-lane highway, principal urban arterial, or major rural route where the interchanging traffic is heavy or includes many road users unfamiliar with the area.
  47. **Major Street**—the street normally carrying the higher volume of vehicular traffic.
  - 47A. **Markings** – All lines, words, or symbols, except signs, officially placed within the roadway to regulate, warn or guide traffic.
  48. **Median**—the area between two roadways of a divided highway measured from edge of traveled way to edge of traveled way. The median excludes turn lanes. The median width might be different between intersections, interchanges, and at opposite approaches of the same intersection.
  49. **Minor Interchange**—an interchange where traffic is local and very light, such as interchanges with land service access roads. Where the sum of the exit volumes is estimated to be lower than 100 vehicles per day in the design year, the interchange is classified as local.
  50. **Minor Street**—the street normally carrying the lower volume of vehicular traffic.
  51. **Object Marker**—a device used to mark obstructions within or adjacent to the roadway.
  52. **Occupancy Requirement**—any restriction that regulates the use of a facility for any period of the day based on a specified number of persons in a vehicle.
  53. **Occupant**—a person driving or riding in a car, truck, bus, or other vehicle.
  54. **Paved**—a bituminous surface treatment, mixed bituminous concrete, or Portland cement concrete roadway surface that has both a structural (weight bearing) and a sealing purpose for the roadway.
  55. **Pedestrian**—a person afoot, in a wheelchair, on skates, or on a skateboard.

56. **Pedestrian Facilities**—a general term denoting improvements and provisions made to accommodate or encourage walking.
57. **Platoon**—a group of vehicles or pedestrians traveling together as a group, either voluntarily or involuntarily, because of traffic signal controls, geometrics, or other factors.
58. **Principal Legend**—place names, street names, and route numbers placed on guide signs.
59. **Public Road**—any road or street under the jurisdiction of and maintained by a public agency and open to public travel.
60. **Raised Pavement Marker**—a device with a height of at least 10 mm (0.4 in) mounted on or in a road surface that is intended to be used as a positioning guide or to supplement or substitute for pavement markings or to mark the position of a fire hydrant.
61. **Regulatory Sign**—a sign that gives notice to road users of traffic laws or regulations.
62. **Retroreflectivity**—a property of a surface that allows a large portion of the light coming from a point source to be returned directly back to a point near its origin.
63. **Right-of-Way [Assignment]**—the permitting of vehicles and/or pedestrians to proceed in a lawful manner in preference to other vehicles or pedestrians by the display of sign or signal indications.
64. **Road**—see Roadway.
65. **Roadway**—that portion of a highway improved, designed, or ordinarily used for vehicular travel and parking lanes, but exclusive of the sidewalk, berm, or shoulder even though such sidewalk, berm, or shoulder is used by persons riding bicycles or other human-powered vehicles. In the event a highway includes two or more separate roadways, the term roadway as used herein shall refer to any such roadway separately, but not to all such roadways collectively.
66. **Roadway Network**—a geographical arrangement of intersecting roadways.
67. **Road User**—a vehicle operator, bicyclist, or pedestrian within the highway, including persons with disabilities.
68. **Roundabout Intersection**—a circular intersection with yield control of all entering traffic, channelized approaches, and appropriate geometric curvature, such that travel speeds on the circulatory roadway are typically less than 50 km/h (30 mph).
69. **Rumble Strip** - a series of intermittent, narrow, transverse areas of rough-textured, slightly raised, or depressed road surface that is installed to alert road users to unusual traffic conditions.
70. **Rural Highway**—a type of roadway normally characterized by lower volumes, higher speeds, fewer turning conflicts, and less conflict with pedestrians.
- 70A. **Scenic Highway** - An officially designated portion of the State Highway System traversing areas of outstanding scenic beauty which together with the adjacent scenic corridors requires special scenic conservation treatment.
71. **Shared Roadway**—a roadway that is officially designated and marked as a bicycle route, but which is open to motor vehicle travel and upon which no bicycle lane is designated.
72. **Shared-Use Path**—a bikeway outside the traveled way and physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right-of-way or within an independent alignment. Shared-use paths are also used by pedestrians (including skaters, users of manual and motorized wheelchairs, and joggers) and other authorized motorized and nonmotorized users.
- 72A. **Shoulder** - The portion of the roadway contiguous with the traveled way for accommodations of stopped vehicles, for emergency use, and for lateral support of base and surface courses.
73. **Sidewalk**—that portion of a street between the curb line, or the lateral line of a roadway, and the adjacent property line or on easements of private property that is paved or improved and intended for use by pedestrians.
74. **Sign**—any traffic control device that is intended to communicate specific information to road users through a word or symbol legend. Signs do not include traffic control signals, pavement markings, delineators, or channelization devices.
75. **Sign Assembly**—a group of signs, located on the same support(s), that supplement one another in conveying information to road users.

- 76. Sign Illumination**—either internal or external lighting that shows similar color by day or night. Street or highway lighting shall not be considered as meeting this definition.
- 77. Sign Legend**—all word messages, logos, and symbol designs that are intended to convey specific meanings.
- 78. Sign Panel**—a separate panel or piece of material containing a word or symbol legend that is affixed to the face of a sign.
- 79. Speed**—speed is defined based on the following classifications:
- (a) **Advisory Speed**—a recommended speed for all vehicles operating on a section of highway and based on the highway design, operating characteristics, and conditions.
  - (b) **Average Speed**—the summation of the instantaneous or spot-measured speeds at a specific location of vehicles divided by the number of vehicles observed.
  - (c) **Design Speed**—a selected speed used to determine the various geometric design features of a roadway.
  - (d) **85th-Percentile Speed**—The speed at or below which 85 percent of the motor vehicles travel.
  - (e) **Operating Speed**—a speed at which a typical vehicle or the overall traffic operates. Operating speed might be defined with speed values such as the average, pace, or 85th-percentile speeds.
  - (f) **Pace Speed**—the highest speed within a specific range of speeds that represents more vehicles than in any other like range of speed. The range of speeds typically used is 10 km/h or 10 mph.
  - (g) **Posted Speed**—the speed limit determined by law and shown on Speed Limit signs.
  - (h) **Statutory Speed**—a speed limit established by legislative action that typically is applicable for highways with specified design, functional, jurisdictional and/or location characteristic and is not necessarily shown on Speed Limit signs.
- 80. Speed Limit**—the maximum (or minimum) speed applicable to a section of highway as established by law.
- 81. Speed Measurement Marking**—a white transverse pavement marking placed on the roadway to assist the enforcement of speed regulations.
- 82. Speed Zone**—a section of highway with a speed limit that is established by law but which might be different from a legislatively specified statutory speed limit.
- 82A. State Highway** – Any highway owned and operated by the Department of Transportation.
- 83. Stop Line**—a solid white pavement marking line extending across approach lanes to indicate the point at which a stop is intended or required to be made. For all purposes, limit line(s) as defined per CVC 377 shall mean stop line(s).
- 84. Street**—see Highway.
- 85. Temporary Traffic Control Zone**—an area of a highway where road user conditions are changed because of a work zone or incident by the use of temporary traffic control devices, flaggers, uniformed law enforcement officers, or other authorized personnel.
- 86. Traffic**—pedestrians, bicyclists, ridden or herded animals, vehicles, streetcars, and other conveyances either singularly or together while using any highway for purposes of travel.
- 87. Traffic Control Device**—a sign, signal, marking, or other device used to regulate, warn, or guide traffic, placed on, over, or adjacent to a street, highway, pedestrian facility, or shared-use path by authority of a public agency having jurisdiction.
- 88. Traffic Control Signal (Traffic Signal)**—any highway traffic signal by which traffic is alternately directed to stop and permitted to proceed.
- 89. Train**—one or more locomotives coupled, with or without cars, that operates on rails or tracks and to which all other traffic must yield the right-of-way by law at highway-rail grade crossings.
- 90. Transverse Markings**—pavement markings that are generally placed perpendicular and across the flow of traffic such as shoulder markings, word and symbol markings, stop lines, crosswalk lines, speed measurement markings, parking space markings, and others.

- 91. Traveled Way**—the portion of the roadway for the movement of vehicles, exclusive of the shoulders, berms, sidewalks, and parking lanes.
- 92. Urban Street**—a type of street normally characterized by relatively low speeds, wide ranges of traffic volumes, narrower lanes, frequent intersections and driveways, significant pedestrian traffic, and more businesses and houses.
- 93. Vehicle**—every device in, upon, or by which any person or property can be transported or drawn upon a highway, except trains and light rail transit operating in exclusive or semiexclusive alignments. Light rail transit operating in a mixed-use alignment, to which other traffic is not required to yield the right-of-way by law, is a vehicle.
- 94. Warning Sign**—a sign that gives notice to road users of a situation that might not be readily apparent.
- 95. Warrant**—a warrant describes threshold conditions to the engineer in evaluating the potential safety and operational benefits of traffic control devices and is based upon average or normal conditions. Warrants are not a substitute for engineering judgment. The fact that a warrant for a particular traffic control device is met is not conclusive justification for the installation of the device.
- 96. Wrong-Way Arrow**—a slender, elongated, white pavement marking arrow placed upstream from the ramp terminus to indicate the correct direction of traffic flow. Wrong-way arrows are intended primarily to warn wrong-way road users that they are going in the wrong direction.

Support:

The following terms are defined in the California Vehicle Code:

1. Alley - Section 110.
2. Amber - Section 112.
3. Authorized Emergency Vehicle - Section 165.
4. Automated Enforcement System - Section 210.
5. Axle - Section 230.
6. Bicycle - Section 231.
7. Bus - Section 233.
8. Business District - Section 235.
9. Clean Fuel Vehicle - Section 257.
10. Commercial Vehicle - Section 260.
11. Crosswalk - Section 275.
12. Department of Transportation - Section 291.
13. Disabled Person - Section 295.5.
14. Engineering and Traffic Survey - Section 627.
15. Freeway - Section 332.
16. Golf Cart - Section 345.
17. Hazardous Material - Section 353.
18. Highway - Section 360.
19. Intersection - Section 365.
20. Limit Line - Section 377.
21. Local Authorities - Section 385.
22. Motorcycle - Section 400.
23. Motor Vehicle - Section 415.
24. Official Traffic Control Device - Section 440.
25. Official Traffic Control Signal - Section 445.
26. Park or Parking - Section 463.
27. Pedestrian - Section 467.
28. Pickup Truck - Section 471.
29. Private Road or Driveway - Section 490.
30. Private School - Section 492.
31. Road - Section 527.

32. Roadway - Section 530.
33. Schoolbus - Section 545.
34. Sidewalk - Section 555.
35. Snowmobile - Section 557.
36. Stop or Stopping - Section 587.
37. Street - Section 590.
38. Street or Highway - Section 591.
39. Street or Highway – Highway Exclusion - Section 592.
40. Through Highway - Section 600.
41. Traffic - Section 620.
42. Trailer - Section 630.
43. U-Turn - Section 665.5.
44. Vehicle - Section 670.

#### **Section 1A.14 Abbreviations Used on Traffic Control Devices**

##### **Standard:**

**When the word messages shown in Table 1A-1 need to be abbreviated in connection with traffic control devices, the abbreviations shown in Table 1A-1 shall be used.**

##### Guidance:

The abbreviations for the words listed in Table 1A-2 should not be used in connection with traffic control devices unless the prompt word shown in Table 1A-2 either precedes or follows the abbreviation.

##### **Standard:**

**The abbreviations shown in Table 1A-3 shall not be used in connection with traffic control devices because of their potential to be misinterpreted by road users.**

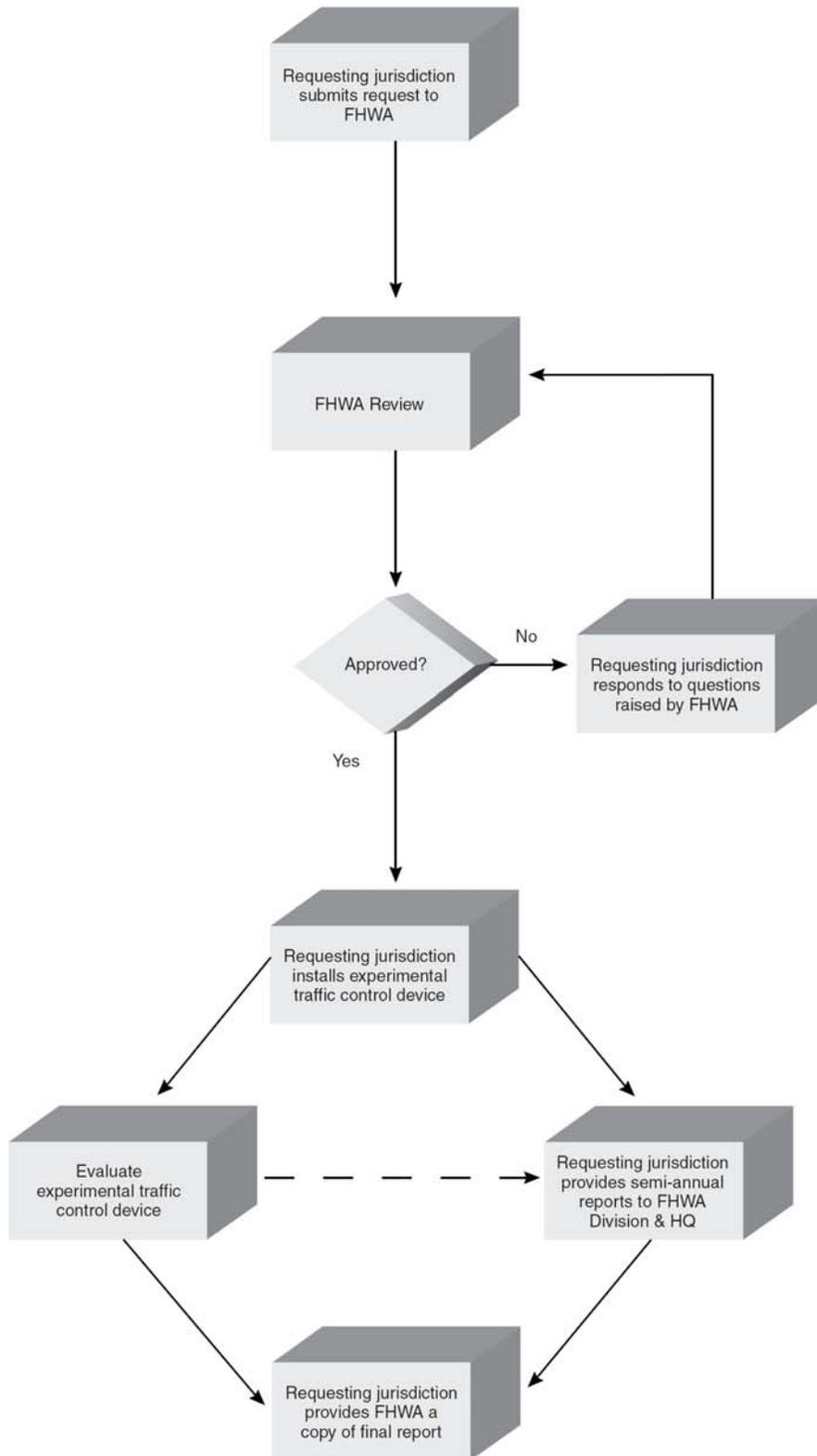
##### Guidance:

Where multiple abbreviations are permitted in Tables 1A-1 or 1A-2, the same abbreviation should be used throughout a single jurisdiction.

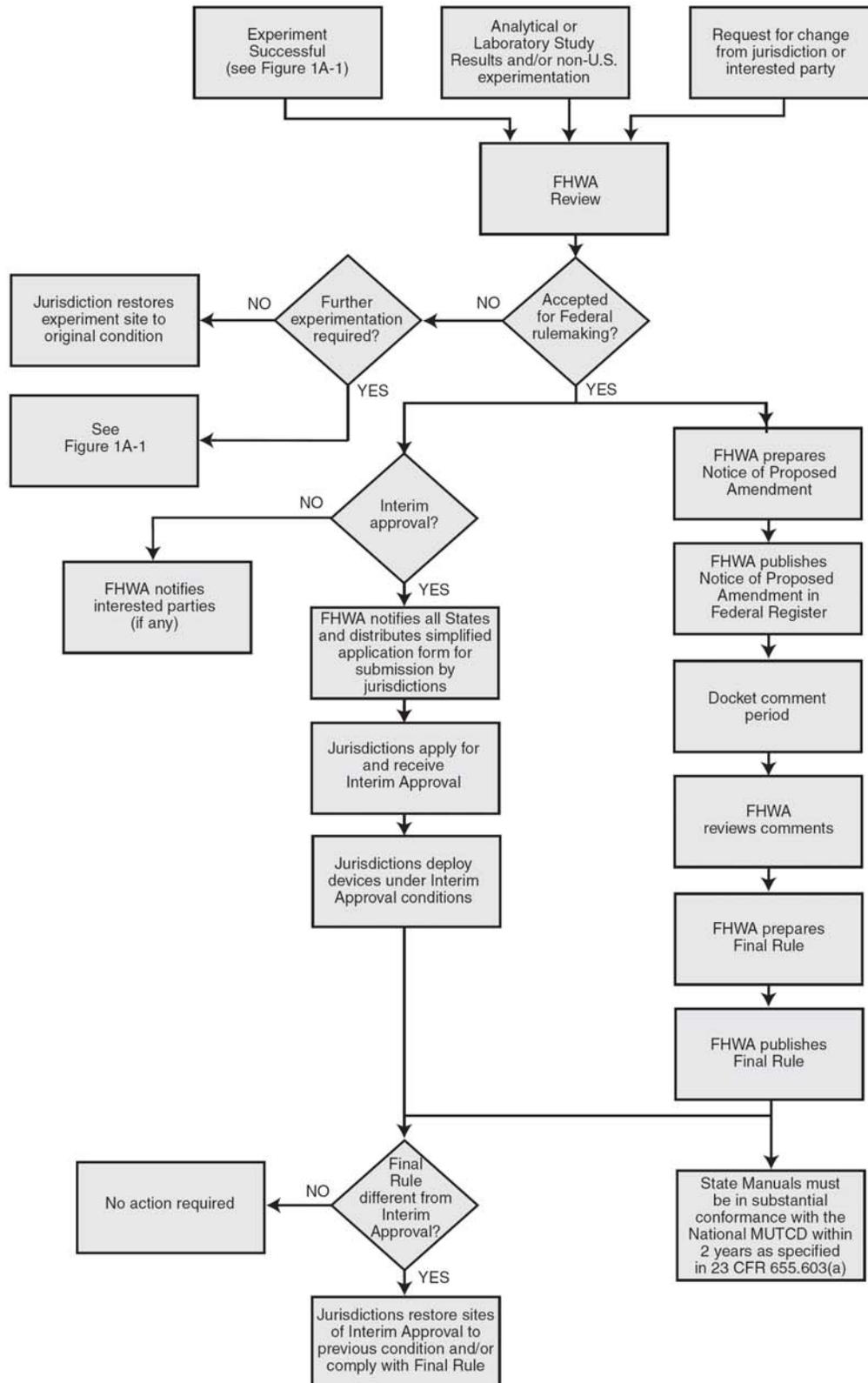
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**Figure 1A-1. Example of Process for Requesting and Conducting Experimentations for New Traffic Control Devices**



**Figure 1A-2. Example of Process for Incorporating New Traffic Control Devices into the MUTCD**



**Table 1A-1. Acceptable Abbreviations**

Word Message	Standard Abbreviation	Word Message	Standard Abbreviation
Afternoon / Evening	PM	Maintenance	MAINT
Alternate	ALT	Meter(s)	m
Avenue	AVE, AV	Metric Ton	t
Bicycle	BIKE	Mile(s)	MI
Boulevard	BLVD	Miles Per Hour	MPH
Cannot	CANT	Minute(s)	MIN
CB Radio	CB	Monday	MON
Center	CNTR	Morning / Late Night	AM
Circle	CIR	Normal	NORM
Civil Defense	CD	North	N
Compressed Natural Gas	CNG	Northbound	N-BND
Court	CT	Parking	PKING
Crossing (other than highway-rail)	XING	Parkway	PKWY
Diesel Fuel	D	Pedestrian	PED
Do Not	DONT	Place	PL
Drive	DR	Pounds	LBS
East	E	Right	RHT
Eastbound	E-BND	Road	RD
Electric Vehicle	EV	Saturday	SAT
Emergency	EMER	Service	SERV
Entrance, Enter	ENT	Shoulder	SHLDR
Expressway	EXPWY	Slippery	SLIP
Feet	FT	South	S
FM Radio	FM	Southbound	S-BND
Freeway	FRWY, FWY	Speed	SPD
Friday	FRI	Street	ST
Hazardous Material	HAZMAT	Sunday	SUN
High Occupancy Vehicle	HOV	Telephone	PHONE
Highway	HWY	Temporary	TEMP
Highway-Rail Grade Crossing Pavement Marking	RXR	Terrace	TER
Hospital	H	Thursday	THURS
Hour(s)	HR	Tires With Lugs	LUGS
Information	INFO	Tons of Weight	T
Inherently Low Emission Vehicle	ILEV	Traffic	TRAF
It Is	ITS	Trail	TR
Junction / Intersection	JCT	Travelers	TRAVLRS
Kilogram	kg	Tuesday	TUES
Kilometer(s)	km	Two-Way Intersection	2-WAY
Kilometers Per Hour	km/h	Two-Wheeled Vehicles	CYCLES
Lane	LN	US Numbered Route	US
Left	LFT	Vehicle(s)	VEH
Liquid Propane Gas	LP-GAS	Warning	WARN
		Wednesday	WED
		West	W
		Westbound	W-BND
		Will Not	WONT

**Table 1A-2. Abbreviations That Are Acceptable  
Only with a Prompt Word**

<b>Word</b>	<b>Abbreviation</b>	<b>Prompt Word</b>
Access	ACCS	Road
Ahead	AHD	Fog*
Blocked	BLKD	Lane*
Bridge	BRDG	[Name]*
Chemical	CHEM	Spill
Condition	COND	Traffic*
Congested	CONG	Traffic*
Construction	CONST	Ahead
Downtown	DWNTN	Traffic
Exit	EX, EXT	Next*
Express	EXP	Lane
Frontage	FRNTG	Road
Hazardous	HAZ	Driving
Interstate	I	[Number]
Local	LOC	Traffic
Lower	LWR	Level
Major	MAJ	Accident
Minor	MNR	Accident
Oversized	OVRSZ	Load
Prepare	PREP	To Stop
Pavement	PVMT	Wet*
Quality	QLTY	Air*
Roadwork	RDWK	Ahead [Distance]
Route	RT, RTE	Best*
Township	TWNSHP	Limits
Turnpike	TRNPK	[Name]*
Upper	UPR	Level

\* These prompt words should precede the abbreviation

**Table 1A-3. Unacceptable Abbreviations**

<b>Abbreviation</b>	<b>Intended Word</b>	<b>Common Misinterpretations</b>
ACC	Accident	Access (Road)
CLRS	Clears	Colors
DLY	Delay	Daily
FDR	Feeder	Federal
L	Left	Lane (Merge)
LT	Light (Traffic)	Left
PARK	Parking	Park
POLL	Pollution (Index)	Poll
RED	Reduce	Red
STAD	Stadium	Standard
WRNG	Warning	Wrong

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# California Manual on Uniform Traffic Control Devices

for Streets and Highways

(FHWA's MUTCD 2003 Edition,  
as amended for use in California)

## PART 6 Temporary Traffic Control



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

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## PART 6. TEMPORARY TRAFFIC CONTROL

### TABLE OF CONTENTS

		<u>Page</u>
<b>CHAPTER 6A.</b>	<b>GENERAL</b>	
Section 6A.01	General	6A-1
<b>CHAPTER 6B.</b>	<b>FUNDAMENTAL PRINCIPLES</b>	
Section 6B.01	Fundamental Principles of Temporary Traffic Control	6B-1
<b>CHAPTER 6C.</b>	<b>TEMPORARY TRAFFIC CONTROL ELEMENTS</b>	
Section 6C.01	Temporary Traffic Control Plans	6C-1
Section 6C.02	Temporary Traffic Control Zones	6C-3
Section 6C.03	Components of Temporary Traffic Control Zones	6C-3
Section 6C.04	Advance Warning Area	6C-3
Section 6C.05	Transition Area	6C-4
Section 6C.06	Activity Area	6C-4
Section 6C.07	Termination Area	6C-5
Section 6C.08	Tapers	6C-5
Section 6C.09	Detours and Diversions	6C-6
Section 6C.10	One-Lane, Two-Way Traffic Control	6C-6
Section 6C.11	Flagger Method of One-Lane, Two-Way Traffic Control	6C-7
Section 6C.12	Flag Transfer Method of One-Lane, Two-Way Traffic Control	6C-7
Section 6C.13	Pilot Car Method of One-Lane, Two-Way Traffic Control	6C-7
Section 6C.14	Temporary Traffic Control Signal Method of One-Lane, Two-Way Traffic Control	6C-7
Section 6C.15	Stop or Yield Control Method of One-Lane, Two-Way Traffic Control	6C-8
<b>CHAPTER 6D.</b>	<b>PEDESTRIAN AND WORKER SAFETY</b>	
Section 6D.01	Pedestrian Considerations	6D-1
Section 6D.02	Accessibility Considerations	6D-3
Section 6D.03	Worker Safety Considerations	6D-4
<a href="#">Section 6D.101(CA)</a>	<a href="#">Bicycle Considerations</a>	6D-6
<b>CHAPTER 6E.</b>	<b>FLAGGER CONTROL</b>	
Section 6E.01	Qualifications for Flaggers	6E-1
Section 6E.02	High-Visibility Safety Apparel	6E-1
Section 6E.03	Hand-Signaling Devices	6E-1
Section 6E.04	Flagger Procedures	6E-3
Section 6E.05	Flagger Stations	6E-3
<b>CHAPTER 6F.</b>	<b>TEMPORARY TRAFFIC CONTROL ZONE DEVICES</b>	
Section 6F.01	Types of Devices	6F-1

	<u>Page</u>	
Section 6F.02	General Characteristics of Signs	6F-2
Section 6F.03	Sign Placement	6F-3
Section 6F.04	Sign Maintenance	6F-4
Section 6F.05	Regulatory Sign Authority	6F-4
Section 6F.06	Regulatory Sign Design	6F-4
Section 6F.07	Regulatory Sign Applications	6F-5
Section 6F.08	ROAD (STREET) CLOSED Sign (R11-2)	6F-5
Section 6F.09	Local Traffic Only Signs (R11-3a, R11-4)	6F-5
Section 6F.10	Weight Limit Signs (R12-1, R12-2, R12-5)	6F-5
Section 6F.11	STAY IN LANE Sign (R4-9)	6F-6
Section 6F.12	PEDESTRIAN CROSSWALK Sign (R9-8)	6F-6
Section 6F.13	SIDEWALK CLOSED Signs (R9-9, R9-10, R9-11, R9-11a)	6F-6
Section 6F.14	Special Regulatory Signs	6F-6
Section 6F.15	Warning Sign Function, Design and Application	6F-6
Section 6F.16	Position of Advance Warning Signs	6F-7
Section 6F.17	ROAD (STREET) WORK Sign (W20-1)	6F-8
Section 6F.18	DETOUR Sign (W20-2)	6F-9
Section 6F.19	ROAD (STREET) CLOSED Sign (W20-3)	6F-9
Section 6F.20	ONE LANE ROAD Sign (W20-4)	6F-9
Section 6F.21	Lane(s) Closed Signs (W20-5, W20-5a)	6F-9
Section 6F.22	CENTER LANE CLOSED AHEAD Signs (W9-3, W9-3a)	6F-9
Section 6F.23	THRU TRAFFIC MERGE LEFT (RIGHT) Sign (W4-7)	6F-10
Section 6F.24	Lane Ends Sign (W4-2)	6F-10
Section 6F.25	ON RAMP Plaque (W13-4)	6F-10
Section 6F.26	RAMP NARROWS Sign (W5-4)	6F-10
Section 6F.27	SLOW TRAFFIC AHEAD Sign (W23-1)	6F-10
Section 6F.28	EXIT OPEN, EXIT CLOSED, EXIT ONLY Signs (E5-2, E5-2a, E5-3)	6F-11
Section 6F.29	Flagger Sign (W20-7a, W20-7)	6F-11
Section 6F.30	Two-Way Traffic Sign (W6-3)	6F-12
Section 6F.31	Workers Sign (W21-1, W21-1a)	6F-12
Section 6F.32	FRESH OIL (TAR) Sign (W21-2)	6F-12
Section 6F.33	ROAD MACHINERY AHEAD Sign (W21-3)	6F-12
Section 6F.34	Motorized Traffic Signs (W8-6, W11-10)	6F-12
Section 6F.35	Shoulder Work Signs (W21-5, W21-5a, W21-5b)	6F-12
Section 6F.36	SURVEY CREW Sign (W21-6)	6F-13
Section 6F.37	UTILITY WORK Sign (W21-7).	6F-13
Section 6F.38	Signs for Blasting Areas	6F-13
Section 6F.39	BLASTING ZONE AHEAD Sign (W22-1)	6F-13
Section 6F.40	TURN OFF 2-WAY RADIO AND CELL PHONE Sign (W22-2)	6F-14
Section 6F.41	END BLASTING ZONE Sign (W22-3)	6F-14
Section 6F.42	SHOULDER Signs (W8-4, W8-9, W8-9a).	6F-14
Section 6F.43	UNEVEN LANES Sign (W8-11)	6F-14
Section 6F.44	NO CENTER STRIPE Sign (W8-12)	6F-14
Section 6F.45	Double Reverse Curve Signs (W24 Series)	6F-14
Section 6F.46	Other Warning Signs	6F-15
Section 6F.47	Special Warning Signs	6F-15
Section 6F.48	Advisory Speed Plaque (W13-1)	6F-15

	<b><u>Page</u></b>
Section 6F.49	Supplementary Distance Plaque (W7-3a) 6F-15
Section 6F.50	Guide Signs 6F-16
Section 6F.51	ROAD WORK NEXT XX km (MILES) Sign (G20-1). 6F-16
Section 6F.52	END ROAD WORK Sign (G20-2) 6F-16
Section 6F.53	Detour Signs (M4-8, M4-8a, M4-8b, M4-9, M4-9a, M4-9b, M4-9c and M4-10) 6F-16
Section 6F.54	PILOT CAR FOLLOW ME Sign (G20-4) 6F-17
Section 6F.55	Portable Changeable Message Signs 6F-18
Section 6F.56	Arrow Panels 6F-20
Section 6F.57	High-Level Warning Devices (Flag Trees) 6F-21
Section 6F.58	Channelizing Devices 6F-22
Section 6F.59	Cones 6F-23
Section 6F.60	Tubular Markers 6F-24
Section 6F.61	Vertical Panels 6F-25
Section 6F.62	Drums 6F-25
Section 6F.63	Type I, II, or III Barricades 6F-26
Section 6F.64	Direction Indicator Barricades 6F-27
Section 6F.65	Temporary Traffic Barriers as Channelizing Devices 6F-28
Section 6F.66	Longitudinal Channelizing Barricades 6F-28
Section 6F.67	Other Channelizing Devices 6F-29
Section 6F.68	Detectable Edging for Pedestrians 6F-29
Section 6F.69	Temporary Raised Islands 6F-30
Section 6F.70	Opposing Traffic Lane Divider 6F-30
Section 6F.71	Pavement Markings 6F-30
Section 6F.72	Temporary Pavement Markings 6F-31
Section 6F.73	Raised Pavement Markers 6F-32
Section 6F.74	Delineators 6F-32
Section 6F.75	Lighting Devices 6F-33
Section 6F.76	Floodlights 6F-33
Section 6F.77	Flashing Warning Beacons 6F-34
Section 6F.78	Warning Lights 6F-34
Section 6F.79	Steady-Burn Electric Lamps 6F-35
Section 6F.80	Temporary Traffic Control Signals 6F-35
Section 6F.81	Temporary Traffic Barriers 6F-36
Section 6F.82	Crash Cushions 6F-37
Section 6F.83	Vehicle-Arresting Systems 6F-38
Section 6F.84	Rumble Strips 6F-38
Section 6F.85	Screens 6F-39
Section 6F.86	Future and Experimental Devices 6F-39
Section 6F.101(CA)	Channelizers (Permanent type, flexible post) 6F-40
Section 6F.102(CA)	LOOSE GRAVEL Sign (W8-7) 6F-40
Section 6F.103(CA)	NARROW LANE(S) Sign (C12(CA)) 6F-40
Section 6F.104(CA)	Road Work/Speed Limit Sign (C17(CA)) 6F-40
Section 6F.105(CA)	OPEN TRENCH Sign (C27(CA)) 6F-41
Section 6F.106(CA)	Traffic Fines Signs (C40(CA) and C40A(CA)) 6F-42
Section 6F.107(CA)	Moving Lane Closure Signs (W23-1 and SC10(CA), SC11(CA), SC13(CA), SC15(CA)) 6F-42
Section 6F.108(CA)	Object Markers 6F-42

		<u>Page</u>
<b>CHAPTER 6G.</b>	<b>TYPE OF TEMPORARY TRAFFIC CONTROL ZONE ACTIVITIES</b>	
Section 6G.01	Typical Applications	6G-1
Section 6G.02	Work Duration	6G-1
Section 6G.03	Location of Work	6G-3
Section 6G.04	Modifications To Fulfill Special Needs	6G-3
Section 6G.05	Work Affecting Pedestrian and Bicycle Facilities	6G-4
Section 6G.06	Work Outside of Shoulder	6G-5
Section 6G.07	Work on the Shoulder with No Encroachment	6G-6
Section 6G.08	Work on the Shoulder with Minor Encroachment	6G-6
Section 6G.09	Work Within the Median	6G-7
Section 6G.10	Work Within the Traveled Way of Two-Lane Highways	6G-7
Section 6G.11	Work Within the Traveled Way of Urban Streets.	6G-7
Section 6G.12	Work Within the Traveled Way of Multi-Lane, Non-Access Controlled Highways	6G-8
Section 6G.13	Work Within the Traveled Way at an Intersection	6G-9
Section 6G.14	Work Within the Traveled Way of Expressways and Freeways	6G-11
Section 6G.15	Two-Lane, Two-Way Traffic on One Roadway of a Normally Divided Highway	6G-11
Section 6G.16	Crossovers	6G-12
Section 6G.17	Interchanges	6G-12
Section 6G.18	Movable Barriers	6G-12
Section 6G.19	Work in the Vicinity of Highway-Rail Grade Crossings	6G-12
Section 6G.20	Temporary Traffic Control During Nighttime Hours	6G-13
<b>CHAPTER 6H.</b>	<b>TYPICAL APPLICATIONS</b>	
Section 6H.01	Typical Applications	6H-1
<b>CHAPTER 6I.</b>	<b>CONTROL OF TRAFFIC THROUGH TRAFFIC INCIDENT MANAGEMENT AREAS</b>	
Section 6I.01	General	6I-1
Section 6I.02	Major Traffic Incidents	6I-2
Section 6I.03	Intermediate Traffic Incidents	6I-3
Section 6I.04	Minor Traffic Incidents	6I-3
Section 6I.05	Use of Emergency-Vehicle Lighting	6I-3
<b><u>FIGURES</u></b>		
<b>CHAPTER 6C.</b>	<b>TEMPORARY TRAFFIC CONTROL ELEMENTS</b>	
Figure 6C-1	Component Parts of a Temporary Traffic Control Zone	6C-9
<del>Figure 6C-2</del>	<del>Types of Tapers and Buffer Spaces</del>	<del>6C-10</del>
Figure 6C-2 (CA)	Types of Tapers and Buffer Spaces	6C-11
Figure 6C-3	Example of a One-Lane, Two-Way Traffic Taper	6C-12
<b>CHAPTER 6E.</b>	<b>FLAGGER CONTROL</b>	
Figure 6E-1	Use of Hand-Signaling Devices by Flaggers	6E-5

		<u>Page</u>
<b>CHAPTER 6F.</b>	<b>TEMPORARY TRAFFIC CONTROL ZONE DEVICES</b>	
Figure 6F-1	Height and Lateral Location of Signs—Typical Installations	6F-43
Figure 6F-2	Methods of Mounting Signs Other Than on Posts	6F-44
Figure 6F-3	Regulatory Signs in Temporary Traffic Control Zones	6F-45
Figure 6F-4	Warning Signs in Temporary Traffic Control Zones	6F-47
Figure 6F-5	Exit Open and Closed and Detour Signs	6F-50
Figure 6F-6	Advance Warning Arrow Display Specifications	6F-51
Figure 6F-7	Channelizing Devices	6F-52
<a href="#">Figure 6F-101(CA)</a>	<a href="#">California Temporary Traffic Control Signs</a>	6F-54
<a href="#">Figure 6F-102(CA)</a>	<a href="#">Channelizer</a>	6F-55
<a href="#">Figure 6F-103(CA)</a>	<a href="#">Examples of Object Markers in Temporary Traffic Control Zones</a>	6F-56
<b>CHAPTER 6H.</b>	<b>TYPICAL APPLICATIONS</b>	
<del>Figure 6H-1</del>	<del>Work Beyond the Shoulder (TA-1)</del>	<del>6H-7</del>
<a href="#">Figure 6H-1 (CA)</a>	<a href="#">Work Beyond the Shoulder (TA-1)</a>	6H-8
Figure 6H-2	Blasting Zone (TA-2)	6H-10
Figure 6H-3	Work on Shoulders (TA-3)	6H-12
<del>Figure 6H-4</del>	<del>Short Duration or Mobile Operation on Shoulder (TA-4)</del>	<del>6H-14</del>
<a href="#">Figure 6H-4 (CA)</a>	<a href="#">Short Duration or Mobile Operation on Shoulder (TA-4)</a>	6H-15
<del>Figure 6H-5</del>	<del>Shoulder Closure on Freeway (TA-5)</del>	<del>6H-17</del>
<a href="#">Figure 6H-5 (CA)</a>	<a href="#">Shoulder Closure on Freeway (TA-5)</a>	6H-18
Figure 6H-6	Shoulder Work with Minor Encroachment (TA-6)	6H-20
<del>Figure 6H-7</del>	<del>Road Closure with Diversion (TA-7)</del>	<del>6H-22</del>
<a href="#">Figure 6H-7 (CA)</a>	<a href="#">Road Closure with Diversion (TA-7)</a>	6H-23
Figure 6H-8	Road Closure with Off-Site Detour (TA-8)	6H-25
Figure 6H-9	Overlapping Routes with Detour (TA-9)	6H-27
<del>Figure 6H-10</del>	<del>Lane Closure on Two-Lane Road Using Flaggers (TA-10)</del>	<del>6H-29</del>
<a href="#">Figure 6H-10 (CA)</a>	<a href="#">Lane Closure on Two-Lane Road Using Flaggers (TA-10)</a>	6H-30
Figure 6H-11	Lane Closure on Two-Lane Road with Low Traffic Volumes (TA-11)	6H-32
<del>Figure 6H-12</del>	<del>Lane Closure on Two-Lane Road Using Traffic Control Signals (TA-12)</del>	<del>6H-34</del>
<a href="#">Figure 6H-12 (CA)</a>	<a href="#">Lane Closure on Two-Lane Road Using Traffic Control Signals (TA-12)</a>	6H-35
<del>Figure 6H-13</del>	<del>Temporary Road Closure (TA-13)</del>	<del>6H-37</del>
<a href="#">Figure 6H-13 (CA)</a>	<a href="#">Temporary Road Closure (TA-13)</a>	6H-38
<del>Figure 6H-14</del>	<del>Haul Road Crossing (TA-14)</del>	<del>6H-40</del>
<a href="#">Figure 6H-14 (CA)</a>	<a href="#">Haul Road Crossing (TA-14)</a>	6H-41
Figure 6H-15	Work in Center of Road with Low Traffic Volumes (TA-15)	6H-43
Figure 6H-16	Surveying Along Centerline of Road with Low Traffic Volumes (TA-16)	6H-45
Figure 6H-17	Mobile Operations on Two-Lane Road (TA-17)	6H-47
Figure 6H-18	Lane Closure on Minor Street (TA-18)	6H-49
Figure 6H-19	Detour for One Travel Direction (TA-19)	6H-51
Figure 6H-20	Detour for Closed Street (TA-20)	6H-53
Figure 6H-21	Lane Closure on Near Side of Intersection (TA-21)	6H-55
Figure 6H-22	Right Lane Closure on Far Side of Intersection (TA-22)	6H-57
Figure 6H-23	Left Lane Closure on Far Side of Intersection (TA-23)	6H-59

		<u>Page</u>
Figure 6H-24	Half Road Closure on Far Side of Intersection (TA-24)	6H-61
Figure 6H-25	Multiple Lane Closures at Intersection (TA-25)	6H-63
Figure 6H-26	Closure in Center of Intersection (TA-26)	6H-65
Figure 6H-27	Closure at Side of Intersection (TA-27)	6H-67
Figure 6H-28	Sidewalk Detour or Diversion (TA-28)	6H-69
Figure 6H-29	Crosswalk Closures and Pedestrian Detours (TA-29)	6H-71
Figure 6H-30	Interior Lane Closure on Multi-lane Street (TA-30).	6H-73
Figure 6H-31	<del>Lane Closure on Street with Uneven Directional Volumes (TA-31)</del>	6H-75
<a href="#">Figure 6H-31 (CA)</a>	<a href="#">Lane Closure on Street with Uneven Directional Volumes (TA-31)</a>	6H-76
<del>Figure 6H-32</del>	<del>Half Road Closure on Multi-Lane, High-Speed Highway (TA-32)</del>	6H-78
<a href="#">Figure 6H-32 (CA)</a>	<a href="#">Half Road Closure on Multi-Lane, High-Speed Highway (TA-32)</a>	6H-79
Figure 6H-33	Stationary Lane Closure on Divided Highway (TA-33)	6H-81
Figure 6H-34	Lane Closure with Temporary Traffic Barrier (TA-34)	6H-83
Figure 6H-35	Mobile Operation on Multi-lane Road (TA-35)	6H-85
Figure 6H-36	Lane Shift on Freeway (TA-36)	6H-87
<del>Figure 6H-37</del>	<del>Double Lane Closure on Freeway (TA-37)</del>	6H-89
<del>Figure 6H-38</del>	<del>Interior Lane Closure on Freeway (TA-38)</del>	6H-91
Figure 6H-39	Median Crossover on Freeway (TA-39)	6H-93
Figure 6H-40	Median Crossover for Entrance Ramp (TA-40)	6H-95
Figure 6H-41	Median Crossover for Exit Ramp (TA-41)	6H-97
Figure 6H-42	Work in Vicinity of Exit Ramp (TA-42)	6H-99
Figure 6H-43	Partial Exit Ramp Closure (TA-43)	6H-101
Figure 6H-44	Work in Vicinity of Entrance Ramp (TA-44)	6H-103
Figure 6H-45	Movable Barriers (TA-45)	6H-105
Figure 6H-46	Work in Vicinity of Highway-Rail Grade Crossing (TA-46)	6H-107

**CHAPTER 6I. CONTROL OF TRAFFIC THROUGH TRAFFIC INCIDENT MANAGEMENT AREAS**

Figure 6I-1	Examples of Traffic Incident Management Area Signs	6I-4
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**TABLES**

**CHAPTER 6C. TEMPORARY TRAFFIC CONTROL ELEMENTS**

Table 6C-1	Suggested Advance Warning Sign Spacing	6C-13
Table 6C-2	Stopping Sight Distance as a Function of Speed	6C-13
Table 6C-3	Taper Length Criteria for Temporary Traffic Control Zones	6C-14
Table 6C-4	Formulas for Determining Taper Lengths	6C-14
<a href="#">Table 6C-3(CA)</a>	<a href="#">Taper Length Criteria for Temporary Traffic Control Zones for 3.6 m (12 ft) Offset Width</a>	6C-15

**CHAPTER 6E. FLAGGER CONTROL**

Table 6E-1	Stopping Sight Distance as a Function of Speed	6E-6
<a href="#">Table 6E-101(CA)</a>	<a href="#">Longitudinal Buffer Space on Downgrades</a>	6E-7

		<u>Page</u>
<b>CHAPTER 6F.</b>	<b>TEMPORARY TRAFFIC CONTROL ZONE DEVICES</b>	
Table 6F-1	Sizes of Temporary Traffic Control Signs	6F-57
Table 6F-1(CA)	Sizes of California Temporary Traffic Control Signs	6F-61
Table 6F-101(CA)	California Temporary Traffic Control Signs	6F-62
Table 6F-102(CA)	Maximum Spacing of Channelizing Devices	6F-64
<b>CHAPTER 6H.</b>	<b>TYPICAL APPLICATIONS</b>	
Table 6H-1	Index to Typical Applications.	6H-2
Table 6H-2	Meaning of Symbols on Typical Application Diagrams.	6H-4
Table 6H-3	Meaning of Letter Codes on Typical Application Diagrams.	6H-5
Table 6H-4	Formulas for Determining Taper Lengths.	6H-5

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## CHAPTER 6A. GENERAL

### Section 6A.01 General

Support:

Whenever the acronym "TTC" is used in this Chapter, it refers to "temporary traffic control".

**Standard:**

**The needs and control of all road users (motorists, bicyclists, and pedestrians within the highway, including persons with disabilities in accordance with the Americans with Disabilities Act of 1990 (ADA), Title II, Paragraph 35.130) through a TTC zone shall be an essential part of highway construction, utility work, maintenance operations, and the management of traffic incidents.**

Support:

When the normal function of the roadway is suspended, TTC planning provides for continuity of the movement of motor vehicle, bicycle, and pedestrian traffic (including accessible passage); transit operations; and access (and accessibility) to property and utilities.

The primary function of TTC is to provide for the reasonably safe and efficient movement of road users through or around TTC zones while reasonably protecting workers, responders to traffic incidents, and equipment.

Of equal importance to the public traveling through the TTC zone is the safety of workers performing the many varied tasks within the work space. TTC zones present constantly changing conditions that are unexpected by the road user. This creates an even higher degree of vulnerability for the workers and incident management responders on or near the roadway (see Section 6D.03). At the same time, the TTC zone provides for the efficient completion of whatever activity interrupted the normal use of the roadway.

Consideration for road user safety, worker and responder safety, and the efficiency of road user flow is an integral element of every TTC zone, from planning through completion. A concurrent objective of the TTC is the efficient construction and maintenance of the highway and the efficient resolution of traffic incidents.

No one set of TTC devices can satisfy all conditions for a given project or incident. At the same time, defining details that would be adequate to cover all applications is not practical. Instead, Part 6 displays typical applications that depict common applications of TTC devices. The TTC selected for each situation depends on type of highway, road user conditions, duration of operation, physical constraints, and the nearness of the work space or incident management activity to road users.

Improved road user performance might be realized through a well-prepared public relations effort that covers the nature of the work, the time and duration of its execution, the anticipated effects upon road users, and possible alternate routes and modes of travel. Such programs have been found to result in a significant reduction in the number of road users traveling through the TTC zone, which reduces the possible number of conflicts.

**Standard:**

**TTC plans and devices shall be the responsibility of the authority of a public body or official having jurisdiction for guiding road users. There shall be adequate statutory authority for the implementation and enforcement of needed road user regulations, parking controls, speed zoning, and the management of traffic incidents. Such statutes shall provide sufficient flexibility in the application of TTC to meet the needs of changing conditions in the TTC zone.**

Support:

Temporary facilities, including reasonably safe pedestrian routes around work sites, are also covered by the accessibility requirements of the Americans with Disabilities Act of 1990 (ADA) (Public Law 101-336, 104 Stat. 327, July 26, 1990. 42 USC 12101-12213 (as amended)).

Guidance:

The TTC plan should start in the planning phase and continue through the design, construction, and restoration phases. The TTC plans and devices should follow the principles set forth in Part 6. The management of traffic incidents should follow the principles set forth in Chapter 6I.

**Option:**

TTC plans may deviate from the typical applications described in Chapter 6H to allow for conditions and requirements of a particular site or jurisdiction.

**Support:**

The criteria of Part 6 apply to both rural and urban areas. A rural highway is normally characterized by lower volumes, higher speeds, fewer turning conflicts, and less conflict with pedestrians. An urban street is typically characterized by relatively low speeds, wide ranges of road user volumes, narrower roadway lanes, frequent intersections and driveways, significant pedestrian activity, and more businesses and houses.

Per the provisions of the Construction Safety Orders in the California Code of Regulations (Title 8, Division 1, Chapter 4, Subchapter 4, Article 11, Sections 1598 and 1599), this Part of the California MUTCD is incorporated by reference as part of those regulations.

It is the responsibility of the Contractor or Organization performing work on, or adjacent to, a highway to install and maintain such devices which are necessary to provide passage for the traveling public (including pedestrians and bicyclists) through the work, as well as for the safeguard of workers.

**Standard:**

Before work begins, traffic control plans, when developed for handling traffic through a construction or maintenance project, shall be approved by the Engineer of the public agency or authority having jurisdiction over the highway.

**Support:**

The following references from the California Vehicle Code relate to TTC:

- Section 112 – Amber.
- Section 165 – Authorized Emergency Vehicle.
- Section 291 – Department of Transportation.
- Section 385 – Local Authorities.
- Section 21351.3 – Use of Metric System Designations.
- Section 21363 – Detour Signs.
- Section 21367 – Traffic Control: Highway Construction.
- Section 21466.5 – Light Impairing Driver's Vision.
- Section 22362 – Speed Limit Where Persons at Work.

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## CHAPTER 6B. FUNDAMENTAL PRINCIPLES

### Section 6B.01 Fundamental Principles of Temporary Traffic Control

Support:

Whenever the acronym "TTC" is used in this Chapter, it refers to "temporary traffic control".

**Standard:**

**The needs and control of all road users (motorists, bicyclists, and pedestrians within the highway, including persons with disabilities in accordance with the Americans with Disabilities Act of 1990 (ADA), Title II, Paragraph 35.130) through a TTC zone shall be an essential part of highway construction, utility work, maintenance operations, and the management of traffic incidents.**

Support:

Construction, maintenance, utility, and incident zones can all benefit from TTC to compensate for the unexpected or unusual situations faced by road users. When planning for TTC in these zones, it can be assumed that it is appropriate for road users to exercise caution. Even though road users are assumed to be using caution, special care is still needed in applying TTC techniques.

Special plans preparation and coordination with transit, other highway agencies, law enforcement and other emergency units, utilities, schools, and railroad companies might be needed to reduce unexpected and unusual road user operation situations.

During TTC activities, commercial vehicles might need to follow a different route from passenger vehicles because of bridge, weight, clearance, or geometric restrictions. Also, vehicles carrying hazardous materials might need to follow a different route from other vehicles. The Hazardous Materials and National Network signs are included in Sections 2B.52 and 2B.53, respectively.

Experience has shown that following the fundamental principles of Part 6 will assist road users and help protect workers in the vicinity of TTC zones.

Guidance:

Road user and worker safety and accessibility in TTC zones should be an integral and high-priority element of every project from planning through design and construction. Similarly, maintenance and utility work should be planned and conducted with the safety and accessibility of all motorists, bicyclists, pedestrians (including those with disabilities), and workers being considered at all times. If the TTC zone includes a highway-rail grade crossing, early coordination with the railroad company should take place.

Support:

Formulating specific plans for TTC at traffic incidents is difficult because of the variety of situations that can arise.

Guidance:

General plans or guidelines should be developed to provide safety for motorists, bicyclists, pedestrians, workers, enforcement/emergency officials, and equipment, with the following factors being considered:

- A. The basic safety principles governing the design of permanent roadways and roadsides should also govern the design of TTC zones. The goal should be to route road users through such zones using roadway geometrics, roadside features, and TTC devices as nearly as possible comparable to those for normal highway situations.
- B. A TTC plan, in detail appropriate to the complexity of the work project or incident, should be prepared and understood by all responsible parties before the site is occupied. Any changes in the TTC plan ~~should~~ **shall** be approved by ~~an official knowledgeable (for example, trained and/or certified) in proper TTC practices~~ **the Engineer of the public agency or authority having jurisdiction over the highway.**

Road user movement should be inhibited as little as practical, based on the following considerations:

- A. TTC at work and incident sites should be designed on the assumption that drivers will only reduce their speeds if they clearly perceive a need to do so (see Section 6C.01).
- B. Frequent and abrupt changes in geometrics such as lane narrowing, dropped lanes, or main roadway transitions that require rapid maneuvers, should be avoided.
- C. Provisions should be made for the reasonably safe operation of work, particularly on high-speed, high volume roadways.

- D. Road users should be encouraged to use alternative routes that do not include TTC zones.
- E. Bicyclists and pedestrians, including those with disabilities, should be provided with access and reasonably safe passage through the TTC zone.
- F. Roadway occupancy should be scheduled during off-peak hours and, if necessary, night work should be considered.
- G. Early coordination with officials having jurisdiction over the affected cross streets and providing emergency services should occur before roadway or ramp closings.

Motorists, bicyclists, and pedestrians should be guided in a clear and positive manner while approaching and traversing TTC zones and incident sites. The following principles should be applied:

- A. Adequate warning, delineation, and channelization should be provided to assist in guiding road users in advance of and through the TTC zone or incident site by using proper pavement marking, signing, or other devices that are effective under varying conditions. Providing information that is in usable formats by pedestrians with visual disabilities should also be considered.
- B. TTC devices inconsistent with intended travel paths through TTC zones should be removed or covered. However, in intermediate-term stationary, short-term, and mobile operations, where visible permanent devices are inconsistent with intended travel paths, devices that highlight or emphasize the appropriate path should be used. Providing traffic control devices that are accessible to and usable by pedestrians with disabilities should be considered.
- C. Flagging procedures, when used, should provide positive guidance to road users traversing the TTC zone.

To provide acceptable levels of operations, routine day and night inspections of TTC elements should be performed as follows:

- A. Individuals who are knowledgeable (for example, trained and/or certified) in the principles of proper TTC should be assigned responsibility for safety in TTC zones. The most important duty of these individuals should be to check that all TTC devices of the project are reasonably consistent with the TTC plan and are effective in providing reasonably safe conditions for motorists, bicyclists, pedestrians, and workers.
- B. As the work progresses, temporary traffic controls and/or working conditions should be modified in order to provide reasonably safe and efficient road user movement and to provide worker safety. The individual responsible for TTC should have the authority to halt work until applicable or remedial safety measures are taken.
- C. TTC zones should be carefully monitored under varying conditions of road user volumes, light, and weather to check that applicable TTC devices are effective, clearly visible, clean, and in compliance with the TTC plan.
- D. When warranted, an engineering study should be made (in cooperation with law enforcement officials) of reported crashes occurring within the TTC zone. Crash records in TTC zones should be monitored to identify the need for changes in the TTC zone.

Attention should be given to the maintenance of roadside safety during the life of the TTC zone by applying the following principles:

- A. To accommodate run-off-the-road incidents, disabled vehicles, or emergency situations, unencumbered roadside recovery areas or clear zones should be provided where practical.
- B. Channelization of road users should be accomplished by the use of pavement markings, signing, and crashworthy, detectable channelizing devices.
- C. Work equipment, workers' private vehicles, materials, and debris should be stored in such a manner to reduce the probability of being impacted by run-off-the-road vehicles.

Each person whose actions affect TTC zone safety, from the upper-level management through the field workers, should receive training appropriate to the job decisions each individual is required to make. Only those individuals who are trained in proper TTC practices and have a basic understanding of the principles (established by applicable standards and guidelines, including those of this Manual) should supervise the selection, placement, and maintenance of TTC devices used for TTC zones and for incident management.

Good public relations should be maintained by applying the following principles:

- A. The needs of all road users should be assessed such that appropriate advance notice is given and clearly defined alternative paths are provided.
- B. The cooperation of the various news media should be sought in publicizing the existence of and reasons for TTC zones because news releases can assist in keeping the road users well informed.
- C. The needs of abutting property owners, residents, and businesses should be assessed and appropriate accommodations made.
- D. The needs of emergency service providers (law enforcement, fire, and medical) should be assessed and appropriate coordination and accommodations made.
- E. The needs of railroads and transit should be assessed and appropriate coordination and accommodations made.
- F. The needs of operators of commercial vehicles such as buses and large trucks should be assessed and appropriate accommodations made.

**Standard:**

**Before any new detour or temporary route is opened to traffic, all necessary signs shall be in place.**

**All TTC devices shall be removed as soon as practical when they are no longer needed. When work is suspended for short periods of time, TTC devices that are no longer appropriate shall be removed or covered.**

**Support:**

Refer to Department of Transportation's Highway Design Manual Section 110.7 for Traffic Control Plans. See Section 1A.11 for information regarding this publication.

**Standard:**

On State highways, covers for TTC signs shall be of sufficient size and density to completely block out the message so that it is not visible either during the day or at night. Covers shall be fastened securely to prevent movement caused by wind action. Refer to Department of Transportation's Standard Specifications Section 12-3.06. See Section 1A.11 for information regarding this publication.

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## CHAPTER 6C. TEMPORARY TRAFFIC CONTROL ELEMENTS

### Section 6C.01 Temporary Traffic Control Plans

Support:

Whenever the acronym "TTC" is used in this Chapter, it refers to "temporary traffic control".

**Standard:**

**The needs and control of all road users (motorists, bicyclists, and pedestrians within the highway, including persons with disabilities in accordance with the Americans with Disabilities Act of 1990 (ADA), Title II, Paragraph 35.130) through a TTC zone shall be an essential part of highway construction, utility work, maintenance operations, and the management of traffic incidents.**

Support:

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 reasonably safe and efficient 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.

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:

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.

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.

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.

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, reasonably safe travel across intersections with accessible pedestrian signals (see Section 4E.06), 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:

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

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:

This alternate or modified plan should have the approval of the responsible highway agency prior to implementation.

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 10A.05 for additional light rail transit issues to consider for TTC).

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 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 reasonably safely travel through the TTC zone with a speed limit reduction of no more than 16 km/h (10 mph).

A reduction of more than 16 km/h (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 16 km/h (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.

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.

**Support:**

Research has demonstrated that large reductions in the speed limit, such as a 50 km/h (30 mph) reduction, increase speed variance and the potential for crashes. Smaller reductions in the speed limit of up to 16 km/h (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 16 km/h (10 mph) from the normal speed limit has been shown to be more effective.

**Support:**

See Section 2B.116(CA) for more information on speed limits and zones.

See Section 2B.13 for Speed Limit and Speed Zone signs.

See Section 6F.104(CA) for Road Work/Speed Zone (C17(CA)) sign.

**Construction Speed Zones:**

Construction speed zones are established on roads under construction where reduced speed is necessary to limit the risk of an accident to workers and the traveling public during all hours of the day and night. Protection of workers during working hours is provided for under CVC Section 22362.

**Guidance:**

Construction speed zones should be avoided if traffic can be controlled by other means. Speed restrictions should be imposed on the public only when necessary for worker or public safety.

**Standard:**

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

**Guidance:**

The traveled way should be signed and delineated to communicate physical conditions to the motorists such as curvature, narrow roadways, detours, rough roads, dips or humps, etc.

**Option:**

The Advisory Speed (W13-1) plaque may be used in combination with various warning type signs to decrease speed at a particular location.

**Guidance:**

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

**Option:**

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

**Guidance:**

The speed limit should not be lowered more than 16 km/h (10 mph) below the posted or maximum speed.

**Option:**

If the project falls within an established 105 km/h (65 mph) zone, and a 70 km/h (45 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 90 km/h (55 mph) speed limit followed by a reduction to the desired 70 km/h (45 mph).

**Guidance:**

Speed Limit and End Zone signs should be installed at locations jointly agreed upon by the Traffic Engineer and the Construction Engineer. The speed zone should be verified by an engineering and traffic survey.

Support:

Orders for construction speed zones are ordinarily issued for the entire length of the construction project. This avoids the necessity and resulting delay of obtaining a new order 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 contract.

Standard:

Speed restriction signs shall be posted only in areas where the traveling public is affected by construction operations.

Guidance:

As the construction progresses, signs should be moved as appropriate.

Standard:

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:

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

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.

An incident area is an area of a highway where temporary traffic controls are imposed by authorized officials in response to a traffic incident, natural disaster, or special event. 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.

### **Section 6C.03 Components of Temporary Traffic Control Zones**

Support:

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:

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

Option:

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:

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 800 m (0.5 mi) or more.

On urban streets, the effective placement of the first warning sign in meters (feet) should range from 0.75 to 1.5 times the speed limit in km/h (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 30 m (100 ft). 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).

Since rural highways are normally characterized by higher speeds, the effective placement of the first warning sign in meters (feet) should be substantially longer—from 1.5 to 2.25 times the speed limit in km/h (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 450 m (1,500 ft) or more for open highway conditions (see Table 6C-1).

Option:

Advance warning may be eliminated when the activity area is ~~sufficiently removed from the road users' path~~ behind a barrier, more than 600 mm (24 in) behind the curb, or 4.6 m (15 ft) or more from the edge of any roadway so that it does not interfere with the normal flow.

### **Section 6C.05 Transition Area**

Support:

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:**

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

Support:

In mobile operations, the transition area moves with the work space.

### **Section 6C.06 Activity Area**

Support:

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.

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:

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

Guidance:

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

Support:

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

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:

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

Option:

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.

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

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

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

Support:

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

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

Option:

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~~ 6C-2(CA), 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:

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

Option:

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.

Guidance:

If used, an incident response and emergency-vehicle storage area should not extend into any portion of the buffer space.

### **Section 6C.07 Termination Area**

**Standard:**

**The termination area shall be used to return road users to their normal path. The termination area shall extend from the downstream end of the work area to the last TTC device such as END ROAD WORK signs, if posted.**

Option:

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.

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

### **Section 6C.08 Tapers**

Option:

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:

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~~ 6C-2(CA).

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:

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

The maximum distance in meters (feet) between devices in a taper should not exceed 0.2 times the speed limit in km/h (1.0 times the speed limit in mph).

Support:

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

Guidance:

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 a single lane before the end of the transition.

Support:

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:**

A shifting taper should have a length of approximately 0.5 L (see Tables 6C-3, ~~and 6C-4~~ or 6C-3(CA)).

**Support:**

A shoulder taper may 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:**

If used, shoulder tapers should have a length of approximately 0.33 L (see Tables 6C-3, ~~and 6C-4~~ or 6C-3(CA)). 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.

**Option:**

A downstream taper may 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:**

When used, a downstream taper should have a length of approximately 30 m (100 ft) per lane with devices placed at a spacing of approximately 6.1 m (20 ft).

**Support:**

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:**

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 maximum length of 30 m (100 ft) with channelizing devices at approximately 6.1 m (20 ft) spacings should be used to guide traffic into the one-way section.

**Support:**

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

**Standard:**

On State highways, Department of Transportation's Standard Plans for Traffic Control Systems (Standard Plans T10 through T17) shall be used. See Section 1A.11 for information regarding this publication.

### **Section 6C.09 Detours and Diversions**

**Support:**

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

**Guidance:**

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:**

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

**Standard:**

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

**Option:**

Advance signs 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:**

**When traffic in both directions must use a single lane for a limited distance, movements from each end shall be coordinated.**

**Guidance:**

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.

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

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 6F.54, or a traffic control signal should be used to control opposing traffic flows.

Support:

At a spot constriction, such as an isolated pavement patch on highways with lower speeds and adequate sight distance, the movement of traffic through one-lane, two-way constrictions tends to be self-regulating.

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

Option:

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:

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. One of the flaggers should be designated as the coordinator. 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.

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

Support:

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 it is reasonably safe to allow traffic 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 always follows the last road user vehicle proceeding through the section.

Guidance:

The flag transfer method should be employed only where the one-way traffic is confined to a relatively short length of a road, usually not more than 1.6 km (1 mi) in length.

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

Option:

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

Guidance:

The operation of the pilot vehicle should be coordinated with flagging operations or other controls at each end of the one-lane section. The pilot car should have the name of the contractor or contracting authority prominently displayed.

**Standard:**

**The PILOT CAR FOLLOW ME (G20-4) sign (see Figure 6F-4, Sheet 4 of 4) shall be mounted at a conspicuous location on the rear of the vehicle.**

Option:

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

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

Option:

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

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

**Option:**

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:**

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:**

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.

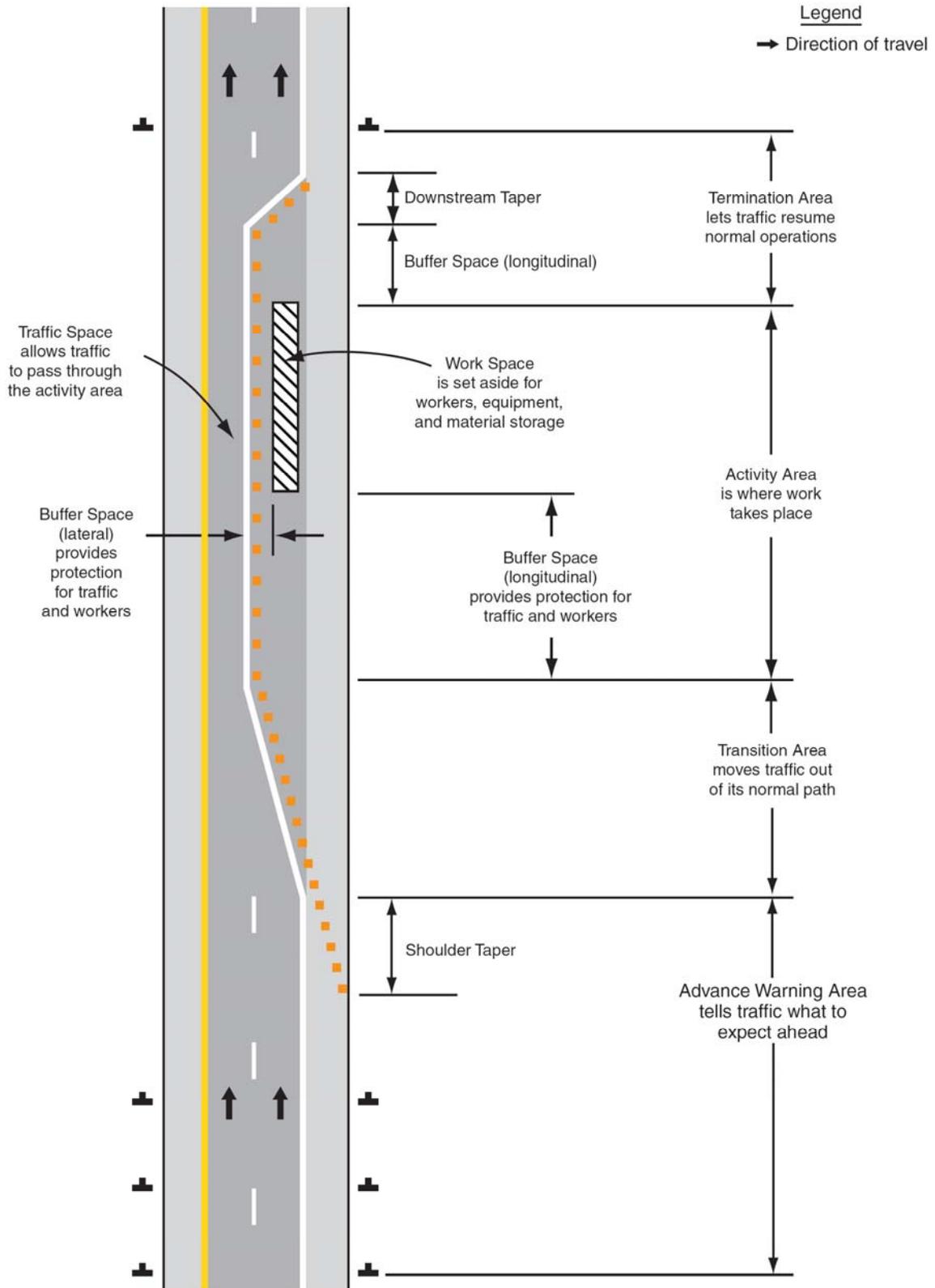
**Support:**

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

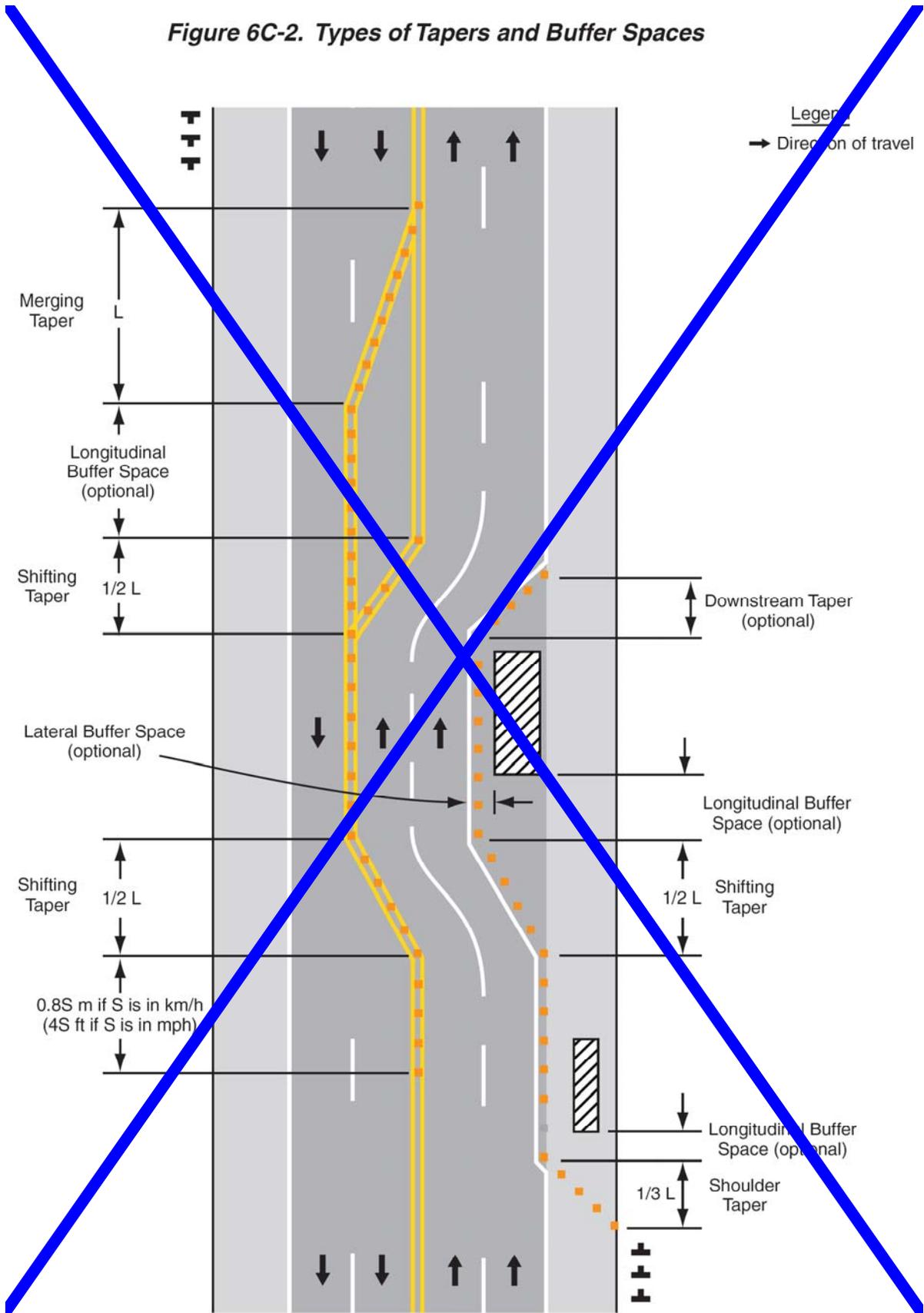
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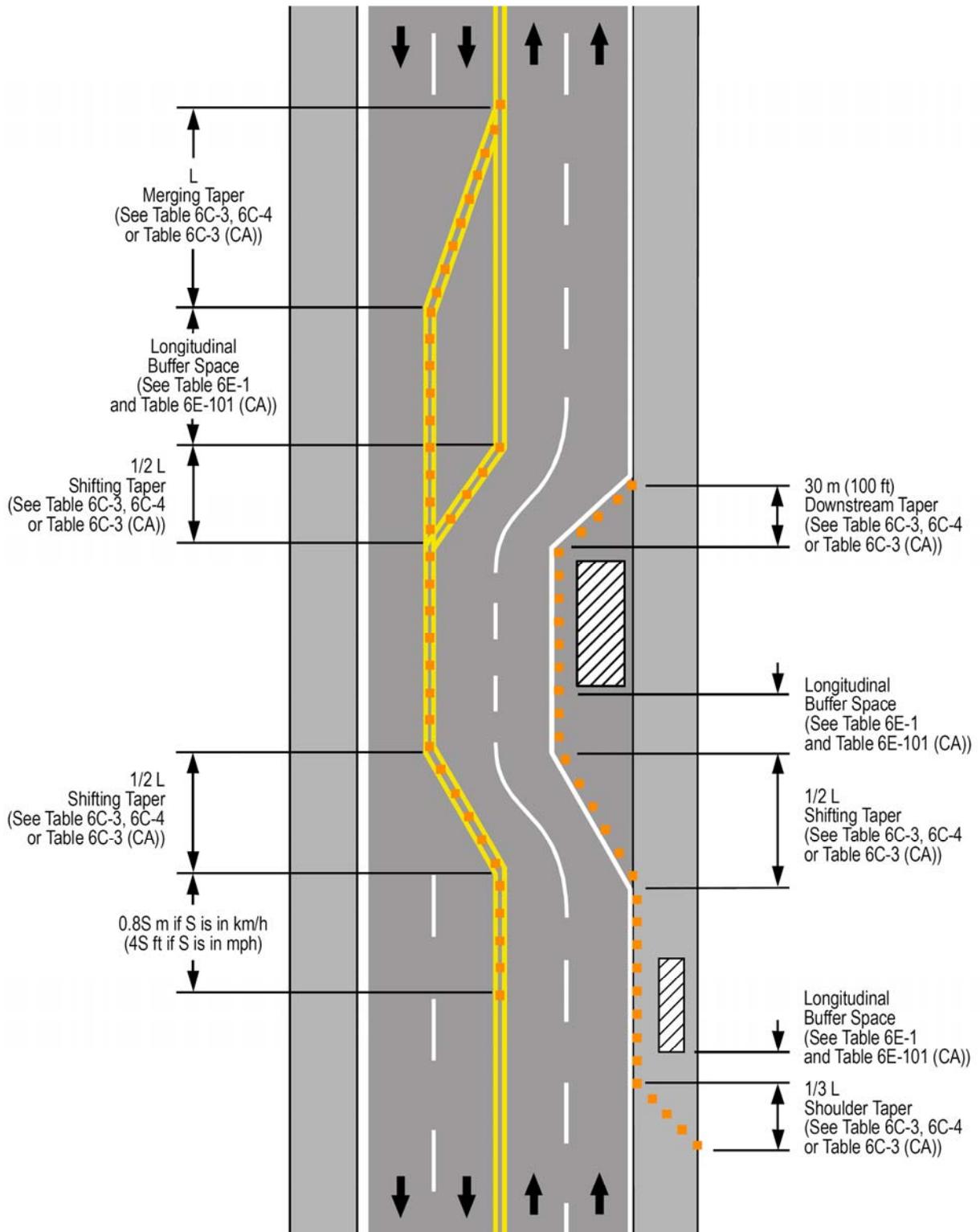
**Figure 6C-1. Component Parts of a Temporary Traffic Control Zone**



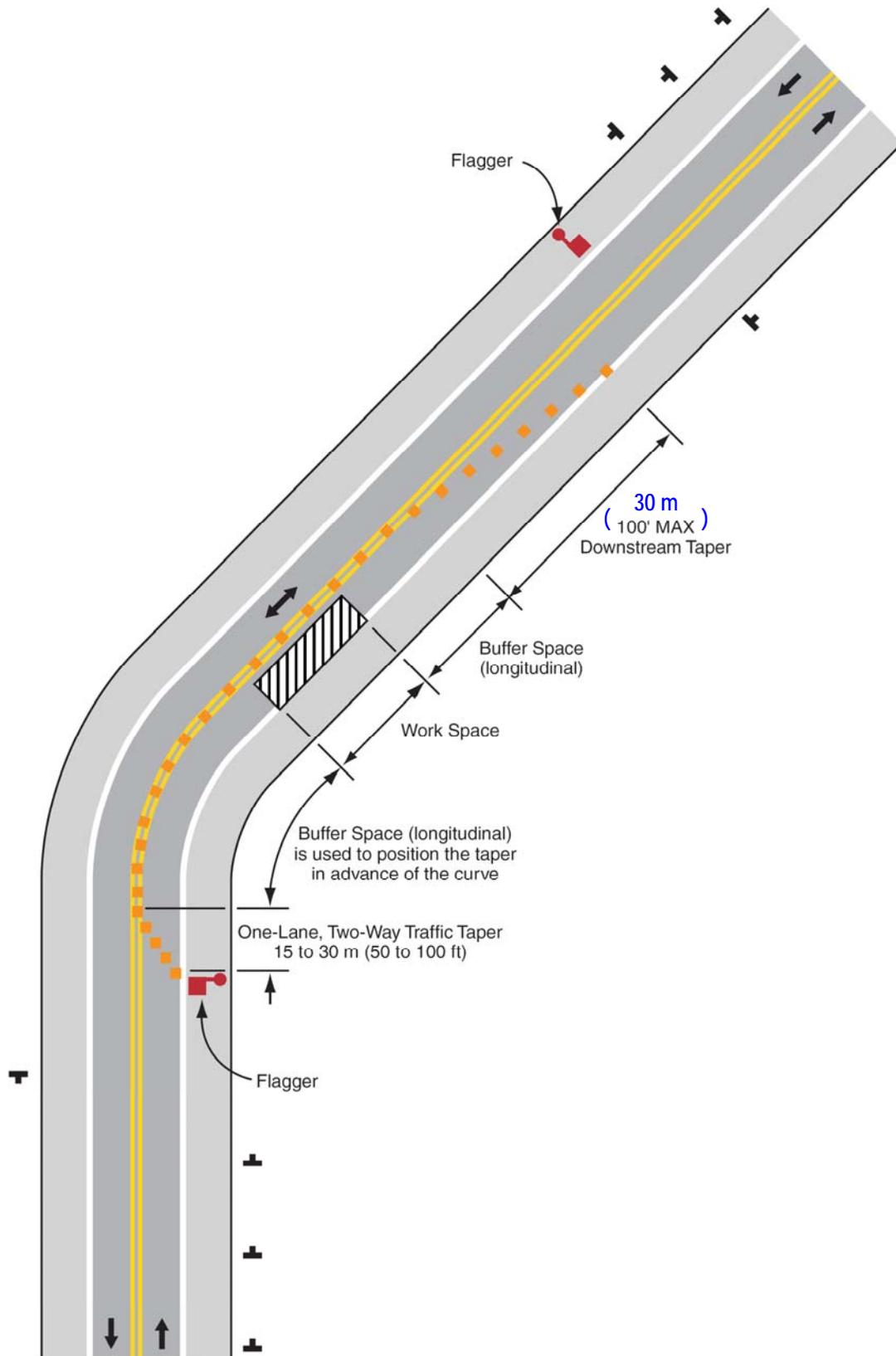
**Figure 6C-2. Types of Tapers and Buffer Spaces**



**Figure 6C-2 (CA). Types of Tapers and Buffer Spaces**



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



**Table 6C-1. Suggested Advance Warning Sign Spacing**

Road Type	Distance Between Signs**		
	A	B	C
Urban (low speed)*	30 (100)	30 (100)	30 (100)
Urban (high speed)*	100 (350)	100 (350)	100 (350)
Rural	150 (500)	150 (500)	150 (500)
Expressway / Freeway	300 (1,000)	450 (1,500)	800 (2,640)

\* Speed category to be determined by highway agency

\*\* Distances are shown in meters (feet). 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 third sign is the first one in a three-sign series encountered by a driver approaching a TTC zone.)

**Table 6C-2. Stopping Sight Distance as a Function of Speed**

Speed* (km/h)	Distance (m)	Speed* (mph)	Distance (ft)
30	35	20	115
40	50	25	155
50	65	30	200
60	85	35	250
70	105	40	305
80	130	45	360
90	160	50	425
100	185	55	495
110	220	60	570
120	250	65	645
		70	730
		75	820

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

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

Type of Taper	Taper Length (L)*
Merging Taper	at least L
Shifting Taper	at least 0.5L
Shoulder Taper	at least 0.33L
One-Lane, Two-Way Traffic Taper	30 m (100 ft) maximum
Downstream Taper	30 m (100 ft) per lane

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

Speed Limit (S)	Taper Length (L) Meters	Speed Limit (S)	Taper Length (L) Feet
60 km/h or less	$L = \frac{WS^2}{155}$	40 mph or less	$L = \frac{WS^2}{60}$
70 km/h or more	$L = \frac{WS}{1.6}$	45 mph or more	$L = WS$

Where: L = taper length in meters (feet)

W = width of offset in meters (feet)

S = posted speed limit, or off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed in km/h (mph)

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Table 6C-3(CA). Taper Length Criteria for Temporary Traffic Control Zones  
for 3.6 m (12 ft) Offset Width

Speed* S (km/h)	Minimum Taper Length** for Width of Offset 3.6 m (W)			
	Merging L (m)	Shifting L/2 (m)	Shoulder L/3 (m)	Down Stream (m)
30	21	10	7	30
40	37	19	12	30
50	58	29	19	30
60	84	42	28	30
70	158	79	53	30
80	180	90	60	30
90	203	101	68	30
100	225	113	75	30
110	248	124	83	30

Speed* S (mph)	Minimum Taper Length** for Width of Offset 12 ft (W)			
	Merging L (ft)	Shifting L/2 (ft)	Shoulder L/3 (ft)	Down Stream (ft)
20	80	40	27	100
25	125	63	42	100
30	180	90	60	100
35	245	123	82	100
40	320	160	107	100
45	540	270	180	100
50	600	300	200	100
55	660	330	220	100
60	720	360	240	100
65	780	390	260	100
70	840	420	280	100

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

\*\* - For other offsets use the following merging taper length formula for L:

For speeds of 65 km/h (40 mph) or less,  $L=WSS/155$  ( $L=WSS/60$ )

For speeds of 70 km/h (45 mph) or more,  $L=WS/1.6$  ( $L=WS$ )

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## CHAPTER 6D. PEDESTRIAN AND WORKER SAFETY

### Section 6D.01 Pedestrian Considerations

Support:

Whenever the acronym "TTC" is used in this Chapter, it refers to "temporary traffic control".

**Standard:**

**The needs and control of all road users (motorists, bicyclists, and pedestrians within the highway, including persons with disabilities in accordance with the Americans with Disabilities Act of 1990 (ADA), Title II, Paragraph 35.130) through a TTC zone shall be an essential part of highway construction, utility work, maintenance operations, and the management of traffic incidents.**

Support:

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.

The most desirable way to provide information to pedestrians with visual disabilities that is equivalent to visual signage 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. Signage 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:

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.

**Standard:**

**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.**

**Advance notification of sidewalk closures shall be provided to the maintaining agency. 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:

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:

Adequate provisions should be made for persons with disabilities as determined by an engineering study or by engineering judgment. 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.

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

- A. Pedestrians should not be led into conflicts with work site vehicles, equipment, and operations.
- B. Pedestrians should not be led into conflicts with vehicles moving through or around the work site.
- C. Pedestrians should be provided with a reasonably safe, convenient, and accessible path that replicates as nearly as practical the most desirable characteristics of the existing sidewalk(s) or footpath(s).

Where pedestrians who have visual disabilities encounter work sites that require them to cross the roadway to find an accessible route, instructions should be provided using an audible information device. Accessible pedestrian signals (see Section 4E.06) with accessible pedestrian detectors (see

Section 4E.09) might be needed to enable pedestrians with visual disabilities to cross wide or heavily traveled roadways.

A pedestrian route should not be severed and/or moved for nonconstruction activities such as parking for vehicles and equipment.

Consideration should be made to separate pedestrian movements from both work site activity and vehicular traffic. Unless a reasonably safe 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 work sites that will induce them to attempt skirting the work site or making a midblock crossing.

Support:

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

Guidance:

When pedestrian movement through or around a work site is necessary, a separate usable footpath should be provided. If the previous pedestrian facility was accessible to pedestrians with disabilities, the footpath provided during temporary traffic control should also be accessible. There should not be any abrupt changes in grade or terrain that could cause a tripping hazard or could be a barrier to wheelchair use. Barriers and channelizing devices should be detectable to pedestrians who have visual disabilities (see Section 6F.68).

Option:

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

Support:

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:

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.

**Standard:**

**TTC devices used to delineate a TTC zone pedestrian walkway shall be crashworthy and, when struck by vehicles, present a minimum threat to pedestrians, workers, and occupants of impacting vehicles.**

Guidance:

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

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.

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 nonintersection crossings where no curb ramps are available.

Option:

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

Guidance:

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

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.

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

Support:

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:**

**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.**

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

Option

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:

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:

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

Support:

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

Guidance:

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.

The extent of pedestrian needs should be determined through engineering judgment for each TTC zone situation. In general, pedestrian routes should be preserved in urban and commercial suburban areas. Alternative routing should be discouraged.

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

### **Section 6D.02 Accessibility Considerations**

Support:

Additional information on the design and construction of accessible temporary facilities is found in publications listed in Section 1A.11 (see Documents 10 and 29 through 31).

Guidance:

The extent of pedestrian needs should be determined through engineering judgment or by the individual responsible for each TTC zone situation. This individual should be aware that the absence of a continuous pathway, including curb ramps and other accessible features, might preclude the use of the facility by pedestrians with disabilities.

**Standard:**

**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.**

**Guidance:**

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 process. Pedestrians should be provided with a reasonably safe, convenient, and accessible path that replicates as much as practical the desirable characteristics of the existing pedestrian facilities.
- B. Access to temporary transit stops should be provided.
- C. 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.
- D. 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 adhere to the provisions of Section 6F.68.
- E. 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).
- F. 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 1500 mm (60 in) throughout the entire length of the pedestrian pathway, a 1500 x 1500 mm (60 x 60 in) passing space should be provided at least every 60 m (200 ft), to allow individuals in wheelchairs to pass.
- G. Signs and other devices mounted lower than 2.1 m (7 ft) above the temporary pedestrian pathway should not project more than 100 mm (4 in) into accessible pedestrian facilities.

**Section 6D.03 Worker Safety Considerations**

**Support:**

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.

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:**

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. Worker Safety Apparel—all workers exposed to the risks of moving roadway traffic or construction equipment should wear high-visibility safety apparel meeting the requirements of ISEA “American National Standard for High-Visibility Safety Apparel” (see Section 1A.11), or equivalent revisions, and labeled as ANSI 107-1999 standard performance for Class 1, 2, or 3 risk exposure. A competent person designated by the employer to be responsible for the worker safety plan within the activity area of the job site should make the selection of the appropriate class of garment. [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.](#)
- C. 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.
- D. 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.](#)
- E. 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.
- F. Worker Safety Planning—a competent person designated by the employer should conduct a basic hazard assessment for the work site 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).

Option:

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. [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.](#)
- 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.
- F. [Public Information - Improved driver performance may be realized through a well-prepared and complete public relations effort that covers the nature of the work, the time and duration of its execution, its anticipated effects on traffic, and possible alternate routes and modes of travel. Such programs can encourage the use of alternate routes, thus allowing consideration of temporary lane closures for additional buffer space.](#)

Support:

Judicious use of the special devices described in Item E above 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:

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

- A travel route that replicates the most desirable characteristics of a wide paved shoulder or bikeway through or around the traffic control zone is desirable for bicyclists.
  - If the traffic control zone interrupts the continuity of an existing bikeway system, signs directing bicyclists through or around the zone and back to the bikeway is desirable.
  - Unless a separate bike path through or around the traffic control zone is provided, adequate roadway lane width to allow bicyclists and motor vehicles to travel side by side through or around the zone is desirable.
  - Bicyclists should not be led into direct conflicts with mainline traffic, work site vehicles, or equipment moving through or around the traffic control zone.
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## CHAPTER 6E. FLAGGER CONTROL

### Section 6E.01 Qualifications for Flaggers

Support:

Whenever the acronym "TTC" is used in this Chapter, it refers to "temporary traffic control".

**Standard:**

**A flagger shall be a person who provides TTC.**

Guidance:

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.

Support:

Refer to Construction Safety Order in the California Code of Regulations (Title 8, Division 1, Chapter 4, Subchapter 4, Article 3, Section 1599 - Flaggers) for flagger training. See Section 1A.11 for information regarding this publication.

### Section 6E.02 High-Visibility Safety Apparel

**Standard:**

**For daytime and nighttime activity, flaggers shall wear safety apparel meeting the requirements of ISEA "American National Standard for High-Visibility Apparel" (see Section 1A.11) and labeled as meeting the ANSI 107-1999 standard performance for Class 2 risk exposure. The apparel background (outer) material color shall be either fluorescent orange-red or fluorescent yellow-green as defined in the standard. The retroreflective material shall be either orange, yellow, white, silver, yellow-green, or a fluorescent version of these colors, and shall be visible at a minimum distance of 300 m (1,000 ft). The retroreflective safety apparel shall be designed to clearly identify the wearer as a person.**

Guidance:

For nighttime activity, safety apparel meeting the requirements of ISEA "American National Standard for High-Visibility Apparel" (see Section 1A.11) and labeled as meeting the ANSI 107-1999 standard performance for Class 3 risk exposure should be considered for flagger wear (instead of the Class 2 safety apparel in the Standard above).

When uniformed law enforcement officers are used, high-visibility safety apparel as described in this Section should be worn by the law enforcement officer.

**Standard:**

**The retroreflective clothing, or the retroreflective material added to the clothing, shall have a minimum of one horizontal stripe around the torso.**

Option:

White outer garments with retroreflective material may be worn during hours of darkness in lieu of colored vests, jackets and/or shirts.

### Section 6E.03 Hand-Signaling Devices

Support:

Hand-signaling devices, such as STOP/SLOW paddles, lights, and red flags, are used to control road users through TTC zones.

**Guidance:**

The STOP/SLOW 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:**

**The STOP/SLOW paddle shall have an octagonal shape on a rigid handle. STOP/SLOW paddles shall be at least 450 mm (18 in) wide with letters at least 150 mm (6 in) high and should be fabricated from light semirigid material. The background of the STOP face shall be red with white letters and border. The background of the SLOW face shall be orange with black letters and border. When used at night, the STOP/SLOW paddle shall be retroreflectorized.**

**Option:**

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; or
- 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; or
- C. One white ~~or red~~ light centered below the STOP legend; and/or one white or yellow light centered below the SLOW legend; or
- D. A series of eight or more small white ~~or red~~ lights no larger than 6 mm (0.25 in) 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 6 mm (0.25 in) in diameter along the outer edge of the paddle, arranged in a diamond pattern along the border of the SLOW face.
- E. A series of white lights forming the shapes of the letters in the legend.

**Standard:**

**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.**

**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.**

**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.**

**Flags, when used, shall be a minimum of 600 mm (24 in) square, made of a good grade of red material, and securely fastened to a staff that is approximately 900 mm (36 in) in length.**

**Guidance:**

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

**Standard:**

**When used at nighttime, flags shall be retroreflectorized red.**

**Option:**

The STOP/SLOW (C28A(CA) and C28B(CA)) paddle may be used with either a 300 mm (12 in) short handle or 1650 mm (66 in) long handle.

The 600 x 600 mm (24 x 24 in) size of the STOP/SLOW paddle may be used where greater emphasis is needed and speeds are 50 km/h (30 mph) or more.

**Support:**

Details for the short and long handle of the STOP/SLOW paddle are shown in Department of Transportation's California Sign Specifications under C28C(CA) code.

### **Section 6E.04 Flagger Procedures**

**Support:**

The use of paddles and flags by flaggers is illustrated in Figure 6E-1.

**Standard:**

**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:**

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:**

**The following methods of signaling with a flag 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 the shoulder level toward approaching traffic.**
- B. To direct stopped road users to proceed, the flagger shall stand parallel to the road user movement and with 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.**

### **Section 6E.05 Flagger Stations**

**Standard:**

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

**Option:**

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 and other conditions that affect stopping distance.

**Guidance:**

Flagger stations should be located such that an errant vehicle has additional space to stop without entering the work space.

**Standard:**

**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:**

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.

**Guidance:**

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, never permitting a group of workers to congregate around the flagger station.

**Option:**

At a spot constriction, the flagger may have to take a position on the shoulder opposite the closed section in order to operate effectively.

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.

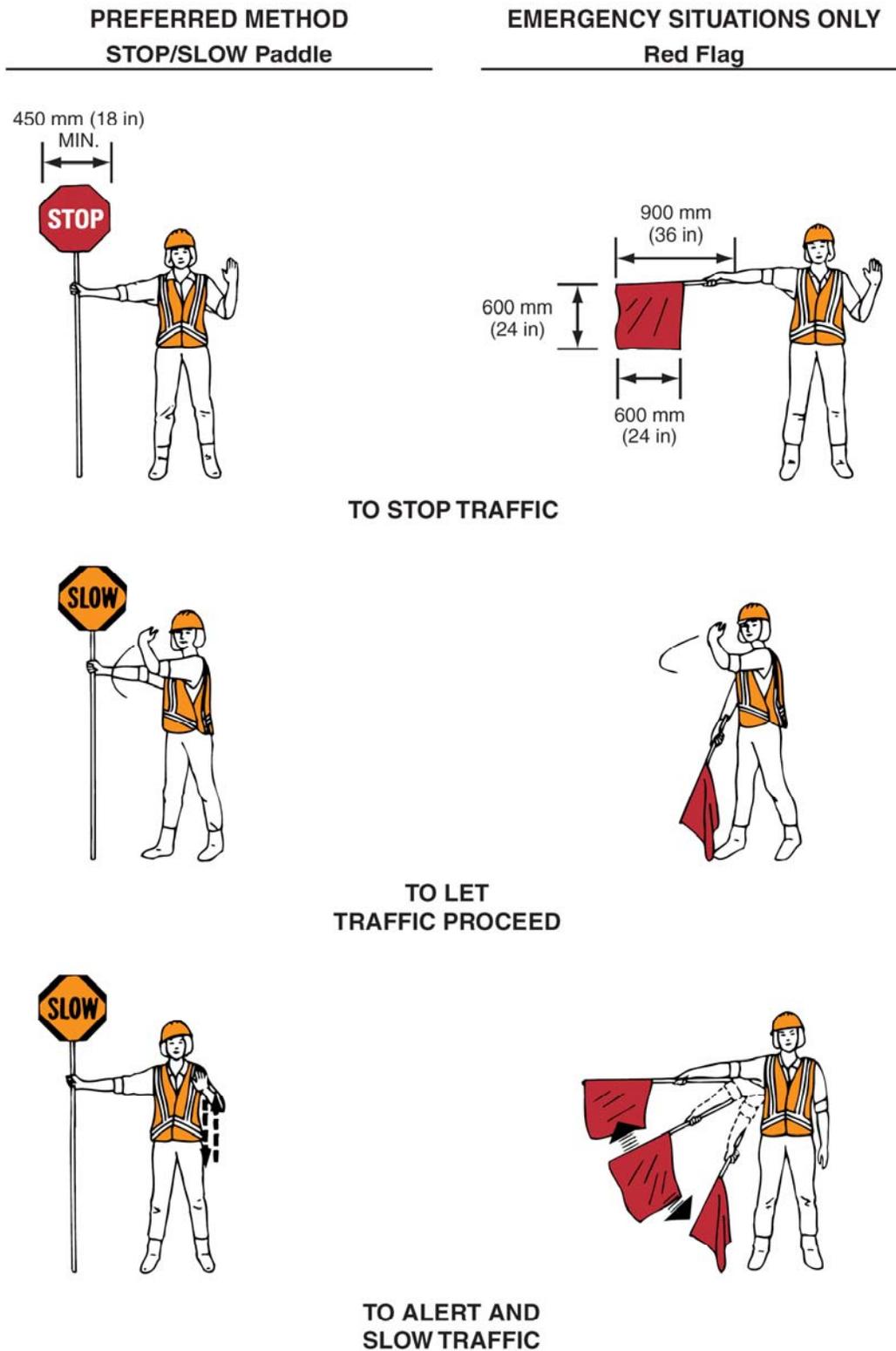
**Option:**

The distances shown in Table 6E-1 may be increased for downgrades, as shown in Table 6E-101(CA).

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**Figure 6E-1. Use of Hand-Signaling Devices by Flaggers**



**Table 6E-1. Stopping Sight Distance as a Function of Speed**

Speed* (km/h)	Distance (m)	Speed* (mph)	Distance (ft)
30	35	20	115
40	50	25	155
50	65	30	200
60	85	35	250
70	105	40	305
80	130	45	360
90	160	50	425
100	185	55	495
110	220	60	570
120	250	65	645
		70	730
		75	820

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

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Table 6E-101(CA). Longitudinal Buffer Space on Downgrades\*

Speed (km/h)	% Downgrade (Buffer Space)		
	-3% (m)	-6% (m)	-9% (m)
30	35	35	35
40	50	50	53
50	66	70	74
60	87	92	97
70	110	116	124
80	136	144	154
90	164	174	187
100	194	207	223
110	227	243	262

Speed (mph)	% Downgrade (Buffer Space)		
	-3% (ft)	-6% (ft)	-9% (ft)
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

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

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## CHAPTER 6F. TEMPORARY TRAFFIC CONTROL ZONE DEVICES

### Section 6F.01 Types of Devices

Support:

Whenever the acronym "TTC" is used in this Chapter, it refers to "temporary traffic control".

**Standard:**

**The needs and control of all road users (motorists, bicyclists, and pedestrians within the highway, including persons with disabilities in accordance with the Americans with Disabilities Act of 1990 (ADA), Title II, Paragraph 35.130) through a TTC zone shall be an essential part of highway construction, utility work, maintenance operations, and the management of traffic incidents.**

Guidance:

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:

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/roadside\\_hardware.htm](http://safety.fhwa.dot.gov/programs/roadside_hardware.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. State Departments of Transportation and local agencies might also have expanded the NCHRP Report 350 crashworthy criteria to apply to other highways in addition to the National Highway System.

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

As stated in Definition 17 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 National Cooperative Highway Research Program Report 350, "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

**Standard:**

**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, pedestrian facility, or bikeway by authority of a public body or official having jurisdiction.**

**All traffic control devices used on street and highway construction, maintenance, utility, or incident management operations shall conform to the applicable provisions of this Manual.**

The Department of Transportation 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.

Crashworthiness of TTC devices shall be substantiated as follows:

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.

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.

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

Support:

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.

Option:

Type III barricades may be used as sign supports if the barricades have been successfully crash tested as one unit with a construction area sign attached.

Support:

Category 1 self-certification form can be obtained at the following Internet address (see last page):

<http://www.dot.ca.gov/hq/traffops/signtech/signdel/policy/05-09.pdf>

Category 2 devices are listed on the "Acceptable Crashworthy Category 2 Hardware for Work Zones" list maintained by both, FHWA and Department of Transportation, available at the following internet addresses:

<http://safety.fhwa.dot.gov/fourthlevel/hardware/listing.cfm?code=workzone>

<http://www.dot.ca.gov/hq/traffops/signtech/signdel/pdf/Category2.pdf> .

Category 3 TTC devices are shown in the Standard Plans, on project plans or listed on the Department's Highway Safety Features list at the following Internet address:

[http://www.dot.ca.gov/hq/esc/approved\\_products\\_list/HighwaySafe.htm](http://www.dot.ca.gov/hq/esc/approved_products_list/HighwaySafe.htm) .

### **Section 6F.02 General Characteristics of Signs**

Support:

TTC zone signs convey both general and specific messages by means of words or symbols and have the same three categories as all road user signs: regulatory, warning, and guide.

**Standard:**

**The colors for regulatory signs shall follow the Standards for regulatory signs in Table 2A-4 2A-4(CA) and Chapter 2B. Warning signs in TTC zones shall have a black legend and border on an orange background, except for the Highway-Rail Grade Crossing Advance Warning (W10-1) sign which shall have a black legend and border on a yellow background, and except for signs that are permitted in Parts 2 or 7 to have fluorescent yellow-green backgrounds. Colors for guide signs shall follow the Standards in Table 2A-4 2A-4(CA) and Chapter 2D, except for guide signs as noted in Section 6F.50.**

Option:

Where the color orange is required, fluorescent red-orange or fluorescent yellow-orange colors may also be used.

Support:

The fluorescent versions of orange provide higher conspicuity than standard orange, especially during twilight.

Option:

Warning and guide signs used for ~~TTC~~ TTC incident management situations (see Chapter 6I) may have a black legend and border on a fluorescent pink background.

Existing warning signs that are still applicable may remain in place.

In order to maintain the systematic use of yellow or fluorescent yellow-green background for pedestrian, bicycle, and school warning signs in a jurisdiction, the yellow or fluorescent yellow-green background for pedestrian, bicycle, and school warning signs may be used in TTC zones.

Standard orange flags or flashing warning lights may be used in conjunction with signs.

**Standard:**

**When standard orange flags or flashing warning lights are used in conjunction with signs, they shall not block the sign face.**

**The sizes for TTC signs shall be as shown in Table 6F-1 or 6F-1(CA).**

Option:

The dimensions of signs shown in Table 6F-1 or 6F-1(CA) may be increased wherever necessary for greater legibility or emphasis, such as on freeways and expressways.

**Standard:**

**Deviations from standard sizes as prescribed herein shall be in 150 mm (6 in) increments.**

Support:

Sign design details are contained in the "Standard Highway Signs" book (see Section 1A.11).

**Standard:**

**All signs used at night shall be either retroreflective with a material that has a smooth, sealed outer surface or illuminated to show the same shape and similar color both day and night.**

**The requirement for sign illumination shall not be considered to be satisfied by street, highway, or strobe lighting.**

Option:

Sign illumination may be either internal or external.

Signs may be made of rigid or flexible material.

Support:

Sign design details are contained in FHWA's Standard Highway Signs book and Department of Transportation's California Sign Specifications. See Section 1A.11 for information regarding these publications.

Table 6F-101(CA) shows a list of California TTC Signs.

Figure 6F-101(CA) shows California TTC Signs.

**Section 6F.03 Sign Placement**

Guidance:

Signs should be located on the right side of the roadway unless otherwise specified in this Manual.

Option:

Where special emphasis is needed, signs may be placed on both the left and right sides of the roadway.

Signs mounted on portable supports may be placed within the roadway itself. Signs may also be mounted on or above barricades.

Support:

The Provisions of this section regarding mounting height apply unless specifically stated otherwise for a particular sign elsewhere in this Manual.

Guidelines for height and lateral clearance of temporary ground-mounted signs are shown in Figure 6F-1.

**Standard:**

**Ground-mounted signs installed at the side of the road in rural areas shall be mounted at a height at least 1.5 m (5 ft), measured from the bottom of the sign to the near edge of the pavement. In business, commercial, and residential districts where parking and/or bicycle or pedestrian movement is likely to occur, or where there are other obstructions to view, the distance between the bottom of the sign and the top of the near edge of the traveled way shall be at least 2.1 m (7 ft).**

**Signs mounted on barricades and barricade/sign combinations shall be crashworthy.**

**Where it has been determined that the accommodation of pedestrians with disabilities is necessary, signs shall be mounted and placed in accordance with Section 4.4 of the "Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)" (see Section 1A.11).**

Guidance:

~~Neither portable nor permanent sign supports should be located on sidewalks, bicycle facilities, or areas designated for pedestrian or bicycle traffic.~~ Sign supports should be located so as to accommodate pedestrians and bicyclists in areas designated for their use. A minimum lateral width of 1.2 m (4 ft) should be maintained for pedestrian pathways. Signs mounted lower than 2.1 m (7 ft) should not project more than 100 mm (4 in) into pedestrian facilities.

Option:

A 2.1 m (7 ft) mounting height may be used in rural areas for increased visibility.

The height to the bottom of a secondary sign mounted below another sign may be 0.3 m (1 ft) less than the appropriate height specified above.

**Guidance:**

Except as noted in the Option, signs mounted on portable supports should not be used for a duration of more than 3 days.

**Option:**

The R9-8 through R9-11a series, R11 series, W1-6 through W1-8 series, M4-10, E5-1, or other similar type signs (see Figures 6F-3, 6F-4, and 6F-5) may be used on portable supports for longer than 3 days.

**Support:**

Methods of mounting signs other than on posts are illustrated in Figure 6F-2.

**Guidance:**

Signs mounted on Type III barricades should not cover more than 50 percent of the top two rails or 33 percent of the total area of the three rails.

**Standard:**

**Sign supports shall be crashworthy. Large signs having an area exceeding 5 square meters (50 square feet) that are installed on multiple breakaway posts shall be mounted a minimum of 2.1 m (7 ft) above the ground.**

**Signs mounted on barricades, or other portable supports, shall be no less than 0.3 m (1 ft) above the traveled way.**

**Option:**

For mobile operations, a sign may be mounted on a work vehicle, a shadow vehicle, or a trailer stationed in advance of the TTC zone or moving along with it. The work vehicle, the shadow vehicle, or the trailer may or may not have an impact attenuator.

**Guidance:**

Unshielded sign posts placed in the clear zone should yield or breakaway upon impact to minimize obstructions to road users.

**Support:**

If alterations are made to specific traffic control device supports that have been successfully crash tested in accordance with NCHRP Report 350 (see Section 1A.11), the altered supports might not be considered to be crashworthy.

#### **Section 6F.04 Sign Maintenance**

**Standard:**

**Signs shall be properly maintained for cleanliness, visibility, and correct positioning.**

**Signs that have lost significant legibility shall be promptly replaced.**

#### **Section 6F.05 Regulatory Sign Authority**

**Support:**

Regulatory signs such as those shown in Figure 6F-3 inform road users of traffic laws or regulations and indicate the applicability of legal requirements that would not otherwise be apparent.

**Standard:**

**Regulatory signs shall be authorized by the public agency or official having jurisdiction and shall conform with Chapter 2B.**

**Support:**

Some of the California regulatory signs used in TTC zones are shown in Figure 6F-101(CA) and Table 6F-101(CA).

#### **Section 6F.06 Regulatory Sign Design**

**Standard:**

**TTC regulatory signs shall conform to the Standards for regulatory signs presented in Part 2 and in the FHWA's "Standard Highway Signs" book (see Section 1A.11).**

**Support:**

Regulatory signs are generally rectangular with a black legend and border on a white background. Exceptions include the STOP, YIELD, DO NOT ENTER, WRONG WAY, and ONE WAY signs.

Option:

The ONE WAY sign may be either a horizontal or vertical rectangular sign.

### **Section 6F.07 Regulatory Sign Applications**

**Standard:**

**If a TTC zone requires regulatory measures different from those existing, the existing permanent regulatory devices shall be removed or covered and superseded by the appropriate temporary regulatory signs. This change shall be made in conformance with applicable ordinances or statutes of the jurisdiction.**

### **Section 6F.08 ROAD (STREET) CLOSED Sign (R11-2)**

Guidance:

The ROAD (STREET) CLOSED (R11-2) sign (see Figure 6F-3, Sheet 2 of 2) should be used when the roadway is closed to all road users except contractors' equipment or officially authorized vehicles. The R11-2 sign should be accompanied by appropriate warning and detour signing.

Option:

The words ~~BRIDGE OUT (or BRIDGE CLOSED)~~ word BRIDGE CLOSED may be substituted for ROAD (STREET) CLOSED where applicable.

Guidance:

The ROAD (STREET) CLOSED sign should be installed at or near the center of the roadway on or above a Type III barricade that closes the roadway (see Section 6F.63).

**Standard:**

**The ROAD (STREET) CLOSED sign shall not be used where road user flow is maintained or where the actual closure is some distance beyond the sign.**

Option:

The word RAMP may be substituted for ROAD or STREET where applicable.

### **Section 6F.09 Local Traffic Only Signs (R11-3a, R11-4)**

Guidance:

The Local Traffic Only signs (see Figure 6F-3, Sheet 2 of 2) should be used where road user flow detours to avoid a closure some distance beyond the sign, but where local road users can use the roadway to the point of closure. These signs should be accompanied by appropriate warning and detour signing.

In rural applications, the Local Traffic Only sign should have the legend ROAD CLOSED XX ~~km~~ (MILES) AHEAD, LOCAL TRAFFIC ONLY (R11-3a).

Option:

In urban areas, the legend ROAD (STREET) CLOSED TO THRU TRAFFIC (R11-4) or ROAD CLOSED, LOCAL TRAFFIC ONLY may be used.

The words BRIDGE OUT (or BRIDGE CLOSED) may be substituted for the words ROAD (STREET) CLOSED on the R11-3a or R11-4 sign where applicable.

Option:

The word RAMP may be substituted for ROAD or STREET where applicable.

### **Section 6F.10 Weight Limit Signs (R12-1, R12-2, R12-5)**

**Standard:**

**A Weight Limit sign (see Figure 6F-3, Sheet 2 of 2), which shows the gross weight ~~or axle weight~~ that is permitted on the roadway or bridge, shall be consistent with State or local regulations and shall not be installed without the approval of the authority having jurisdiction over the highway.**

**When weight restrictions are imposed because of the activity in a TTC zone, a marked detour shall be provided for vehicles weighing more than the posted limit.**

### **Section 6F.11 STAY IN LANE Sign (R4-9)**

**Option:**

A STAY IN LANE (R4-9) sign (see Figure 6F-3, Sheet 1 of 2) may be used where a multi-lane shift has been incorporated as part of the TTC on a highway to direct road users around road work that occupies part of the roadway on a multi-lane highway.

### **Section 6F.12 PEDESTRIAN CROSSWALK Sign (R9-8)**

**Option:**

The PEDESTRIAN CROSSWALK (R9-8) sign (see Figure 6F-3, Sheet 1 of 2) may be used to indicate where a temporary crosswalk has been established.

**Standard:**

**If a temporary crosswalk is established, it shall be accessible to pedestrians with disabilities in accordance with Section 6D.02.**

### **Section 6F.13 SIDEWALK CLOSED Signs (R9-9, R9-10, R9-11, R9-11a)**

**Guidance:**

SIDEWALK CLOSED signs (see Figure 6F-3, Sheet 2 of 2) should be used where pedestrian flow is restricted. Bicycle/Pedestrian Detour (M4-9a) signs or Pedestrian Detour (M4-9b) signs should be used where pedestrian flow is rerouted (see Section 6F.53).

The SIDEWALK CLOSED (R9-9) sign should be installed at the beginning of the closed sidewalk, at the intersections preceding the closed sidewalk, and elsewhere along the closed sidewalk as needed.

The SIDEWALK CLOSED, (ARROW) USE OTHER SIDE (R9-10) sign should be installed at the beginning of the restricted sidewalk when a parallel sidewalk exists on the other side of the roadway.

The SIDEWALK CLOSED AHEAD, (ARROW) CROSS HERE (R9-11) sign should be used to indicate to pedestrians that sidewalks beyond the sign are closed and to direct them to open crosswalks, sidewalks, or other travel paths.

The SIDEWALK CLOSED, (ARROW) CROSS HERE (R9-11a) sign should be installed just beyond the point to which pedestrians are being redirected.

**Support:**

These signs are typically mounted on a detectable barricade to encourage compliance and to communicate with pedestrians that the sidewalk is closed. Printed signs are not useful to many pedestrians with visual disabilities. A barrier or barricade detectable by a person with a visual disability is sufficient to indicate that a sidewalk is closed. If the barrier is continuous with detectable channelizing devices for an alternate route, accessible signage might not be necessary. An audible information device is needed when the detectable barricade or barrier for an alternate channelized route is not continuous.

### **Section 6F.14 Special Regulatory Signs**

**Option:**

Special regulatory signs may be used based on engineering judgment consistent with regulatory requirements.

**Guidance:**

Special regulatory signs should conform to the general requirements of color, shape, and alphabet size and series. The sign message should be brief, legible, and clear.

**Support:**

Section 2B.17 contains information regarding the use of FINES HIGHER signs (see Figure 6F-3, Sheet 1 of 2).

[See Section 6F.106\(CA\) for Traffic Fines Signs.](#)

### **Section 6F.15 Warning Sign Function, Design, and Application**

**Support:**

TTC zone warning signs (see Figure 6F-4) notify road users of specific situations or conditions on or adjacent to a roadway that might not otherwise be apparent.

**Standard:**

TTC warning signs shall conform to the Standards for warning signs presented in Part 2 and in FHWA's "Standard Highway Signs" book (see Section 1A.11). Except as noted in the Option below, TTC warning signs shall be diamond-shaped with a black legend and border on an orange background, except for the W10-1 sign which shall have a black legend and border on a yellow background, and except for signs that are permitted in Parts 2 or 7 to have fluorescent yellow-green backgrounds.

**Option:**

Warning signs used for TCC incident management situations may have a black legend and border on a fluorescent pink background.

Mounting or space considerations may justify a change from the standard diamond shape.

In emergencies, available warning signs having yellow backgrounds may be used if signs with orange or fluorescent pink backgrounds are not at hand.

**Guidance:**

Where roadway or road user conditions require greater emphasis, larger than standard size warning signs should be used, with the symbol or legend enlarged approximately in proportion to the outside dimensions.

Where any part of the roadway is obstructed or closed by work activities or incidents, advance warning signs should be installed to alert road users well in advance of these obstructions or restrictions.

Where road users include pedestrians, the provision of supplemental audible information or detectable barriers or barricades should be considered for people with visual disabilities.

**Support:**

Detectable barriers or barricades communicate very clearly to pedestrians who have visual disabilities that they can no longer proceed in the direction that they are traveling.

**Option:**

Advance warning signs may be used singly or in combination.

**Standard:**

~~Because of their importance, advance warning signs for higher-speed locations shall have a size of 1200 x 1200 mm (48 x 48 in) (see Part 2).~~

~~For freeways and expressways, the size of diamond shaped TTC warning signs shall be a minimum of 1200 x 1200 mm (48 x 48 in).~~

**Option:**

~~Where speeds and volumes are moderately low, a minimum size of 900 x 900 mm (36 x 36 in) may be used for advance warning signs.~~

~~On secondary roads or City streets where speeds are very low, signs smaller than the standard size, but not less than 600 x 600 mm (24 x 24 in), may be used for warning signs having short word messages or clear symbols.~~

**Standard:**

The previous paragraphs are deleted for application and shall not be used in California as "higher-speed", "moderately low" and "very low" are not defined in the MUTCD. Use Table 2C-2 in Part 2 for size of warning signs.

**Option:**

Advance warning signs larger than the minimum standards may be used for additional emphasis of the TTC zone (see Part 2).

Where distances are not shown on warning signs as part of the message, a supplemental plaque with the distance legend may be mounted immediately below the sign on the same support.

**Support:**

Some of the California warning signs used in TTC zones are shown in Figure 6F-101(CA) and Table 6F-101(CA).

**Section 6F.16 Position of Advance Warning Signs**

**Guidance:**

Where highway conditions permit, warning signs should be placed in advance of the TTC zone at varying distances depending on roadway type, condition, and posted speed. Table 6C-1 contains information

regarding the spacing of advance warning signs. Where a series of two or more advance warning signs is used, the closest sign to the TTC zone should be placed approximately 30 m (100 ft) for low-speed urban streets to 300 m (1,000 ft) or more for freeways and expressways.

Support:

Various conditions, such as limited sight distance or obstructions that might require a driver to reduce speed or stop, might require additional advance warning signs.

Option:

As an alternative to a specific distance on advance warning signs, the word AHEAD may be used.

Support:

At TTC zones on lightly-traveled roads, all of the advance warning signs prescribed for major construction might not be needed.

Option:

Utility work, maintenance, or minor construction can occur within the TTC zone limits of a major construction project, and additional warning signs may be needed.

Guidance:

Utility, maintenance, and minor construction signing and TTC should be coordinated with appropriate authorities so that road users are not confused or misled by the additional TTC devices.

### **Section 6F.17 ROAD (STREET) WORK Sign (W20-1)**

Guidance:

The ROAD (STREET) WORK (W20-1) sign (see Figure 6F-4, Sheet 3 of 4), which serves as a general warning of obstructions or restrictions, should be located in advance of the work space or any detour, on the road where the work is taking place.

Where traffic can enter a TTC zone from a crossroad or a major (high-volume) driveway, an advance warning sign should be used on the crossroad or major driveway.

**Standard:**

**The ROAD (STREET) WORK (W20-1) sign shall have the legend ROAD (STREET) WORK, XX m (FT), XX km (MILES), or AHEAD.**

Option:

The word RAMP may be substituted for ROAD or STREET where applicable.

The ROAD (STREET) WORK Informational Plaque (C23B(CA)) may be used with ROAD (STREET) WORK (W20-1) sign.

**Standard:**

The message displayed on the ROAD (STREET) WORK Informational Plaque (C23B(CA)) shall be worded in terms common to motorists, as shown in examples below. The height and width of the plate will vary according to the lettering size and message. The width of the plate shall not exceed the overall width of the W20-1 sign.

Support:

Following are some example messages:

- BRIDGE REPLACEMENT
- BRIDGE WIDENING
- BRIDGE REPAIR
- CURVE IMPROVEMENT
- HIGHWAY REALIGNMENT
- HIGHWAY WIDENING
- HIGHWAY WIDENING AND PAVING
- HIGHWAY REHABILITATION
- STORM REPAIR
- PAVING
- SIGNING IMPROVEMENT
- PAVEMENT MAINTENANCE
- SAFETY IMPROVEMENT

Guidance:

The SPECIAL EVENT AHEAD (SC5(CA)) sign should be used in lieu of the ROAD (STREET) WORK (W20-1) sign for special events, such as bike races, movie filming, etc., where the event is on the travel way or close enough or of such a nature as to cause a potential danger to motorists.

**Section 6F.18 DETOUR Sign (W20-2)**

Guidance:

The DETOUR (W20-2) sign (see Figure 6F-4, Sheet 3 of 4) ~~should~~ **shall** be used in advance of a road user detour over a different roadway or route. Refer to CVC 21363 for detour signs.

**Standard:**

**The DETOUR sign shall have the legend DETOUR, XX m (FT), XX km (MILES), or AHEAD.**

**Section 6F.19 ROAD (STREET) CLOSED Sign (W20-3)**

Guidance:

The ROAD (STREET) CLOSED (W20-3) sign (see Figure 6F-4, Sheet 3 of 4) should be used in advance of the point where a highway is closed to all road users, or to all but local road users.

**Standard:**

**The ROAD (STREET) CLOSED sign shall have the legend ROAD (STREET) CLOSED, XX m (FT), XX km (MILES), or AHEAD.**

Option:

The word RAMP may be substituted for ROAD or STREET, where applicable.

**Section 6F.20 ONE LANE ROAD Sign (W20-4)**

**Standard:**

**The ONE LANE ROAD (W20-4) sign (see Figure 6F-4, Sheet 3 of 4) shall be used only in advance of that point where motor vehicle traffic in both directions must use a common single lane (see Section 6C.10). It shall have the legend ONE LANE ROAD, XX m (FT), XX km (MILES), or AHEAD.**

**Section 6F.21 Lane(s) Closed Signs (W20-5, W20-5a)**

**Standard:**

**The Lane(s) Closed sign (see Figure 6F-4, Sheet 3 of 4) shall be used in advance of that point where one or more through lanes of a multi-lane roadway are closed.**

**For a single lane closure, the Lane Closed (W20-5) sign (see Figure 6F-4, Sheet 3 of 4) shall have the legend RIGHT (LEFT) LANE CLOSED, XX m (FT), XX km (MILES), or AHEAD. Where two adjacent lanes are closed, the W20-5a sign (see Figure 6F-4, Sheet 3 of 4) shall have the legend RIGHT (LEFT) TWO LANES CLOSED, XX m (FT), XX km (MILES), or AHEAD.**

Option:

The Lane Closed (W20-5 or C20(CA)) sign by itself, or in combination with LEFT (C20A(CA)) plaque and/or Numeral (C20B(CA)) plaque may be used.

The LANE CLOSED (C30(CA)) sign may be used within a closed lane of a multilane highway as follow-up information to the appropriate advance warning signs. The C30(CA) sign may be repeated at intervals, throughout long lane closures, as a reminder to motorists.

The words RAMP CLOSED may be used as an alternate message on the C30(CA) signs on surface streets to warn that the upcoming freeway/expressway on ramp is closed.

**Section 6F.22 CENTER LANE CLOSED AHEAD Signs (W9-3, W9-3a)**

Guidance:

The CENTER LANE CLOSED AHEAD (W9-3) sign (see Figure 6F-4, Sheet 2 of 4) should be used in advance of that point where work occupies the center lane(s) and approaching motor vehicle traffic is directed to the right or left of the work zone in the center lane.

Option:

The Center Lane Closed Ahead (W9-3a) symbol sign (~~see Figure 6H-38~~) may be substituted for the CENTER LANE CLOSED AHEAD (W9-3) word message sign.

Support:

For moving lane closures on State highways, see Department of Transportation's Standard Plan T-16. See Section 1A.11 for information regarding this publication.

Do not use the CENTER LANE CLOSED AHEAD (W9-3) and Center Lane Closed Ahead (W9-3a) signs for moving lane closures on State highways.

**Section 6F.23 THRU TRAFFIC MERGE LEFT (RIGHT) Sign (W4-7)**

Guidance:

The THRU TRAFFIC MERGE LEFT (RIGHT) (W4-7) sign (see Figure 6F-4, Sheet 1 of 4) should be used in advance of an intersection where one or more lane closures on the far side of a multi-lane intersection require through vehicular traffic on the approach to the intersection to use the left (right) lane to proceed through the intersection.

Support:

Refer to Section 2C.33 for Lane Ends (W4-2, W9-1) signs and 2C.109 for Lane Drop (W73(CA), W73A(CA) and W4-7) signs.

**Section 6F.24 Lane Ends Sign (W4-2)**

Option:

The Lane Ends (W4-2) symbol sign (see Figure 6F-4, Sheet 1 of 4) ~~may~~ **should** be used to warn drivers of the reduction in the number of lanes for moving motor vehicle traffic in the direction of travel on a multi-lane roadway.

**Section 6F.25 ON RAMP Plaque (W13-4)**

Guidance:

~~When work is being done on a ramp, but the ramp remains open, the ON RAMP (W13-4) plaque (see Figure 6F-4, Sheet 3 of 4) should be used to supplement the advance ROAD WORK sign.~~

Standard:

The ON RAMP (W13-4) plaque shall not be used in California due to the potential for conflict if it is used when the work is being done on an off ramp.

**Section 6F.26 RAMP NARROWS Sign (W5-4)**

Guidance:

~~The RAMP NARROWS (W5-4) sign (see Figure 6F-4, Sheet 1 of 4) should be used in advance of the point where work on a ramp reduces the normal width of the ramp along a part or all of the ramp.~~

Standard:

The RAMP NARROWS (W5-4) sign shall not be used in California. The ROAD NARROWS (W5-1) sign or NARROW LANE(S) (C12(CA)) sign, as appropriate, shall be used instead. See Sections 2C.15 and 6F.103(CA).

**Section 6F.27 SLOW TRAFFIC AHEAD Sign (W23-1)**

Option:

The SLOW TRAFFIC AHEAD (W23-1) sign (see Figure 6F-4, Sheet 4 of 4) may be used on a shadow vehicle, usually mounted on the rear of the most upstream shadow vehicle, along with other appropriate signs for mobile operations to warn of slow moving work vehicles. A ROAD (STREET) WORK (W20-1) sign may also be used with the SLOW TRAFFIC AHEAD sign.

### **Section 6F.28 EXIT OPEN, EXIT CLOSED, EXIT ONLY Signs (E5-2, E5-2a, E5-3)**

**Option:**

An EXIT OPEN (E5-2), EXIT CLOSED (E5-2a), or EXIT ONLY (E5-3) sign (see Figure 6F-5) may be used to supplement other warning signs where work is being conducted in the vicinity of an exit ramp and where the exit maneuver for motor vehicle traffic using the ramp is different from the normal condition.

**Guidance:**

When an exit ramp is closed, an EXIT CLOSED panel with a black legend and border on an orange background should be placed diagonally across the interchange/intersection guide signs.

**Option:**

The USE NEXT EXIT (C38(CA)) sign may be used with the RAMP CLOSED (R11-2, alternate message per Section 6F.08) sign on freeways if the next exit provides access to destinations from the closed ramp.

**Guidance:**

The RAMP CLOSED (Not more than one day) (SC6-3(CA)) sign should be used to inform motorists of the temporary closing of a freeway or expressway entrance or exit ramp for not more than one day.

The RAMP CLOSED (More than one day) (SC6-4(CA)) sign should be used to inform motorists of the temporary closing of a freeway or expressway entrance or exit ramp for more than one day.

The SC6-3(CA) and SC6-4(CA) signs should be removed when the ramp is reopened to traffic.

**Standard:**

**The SC6-3(CA) and SC6-4(CA) signs shall display the correct day of the week, month, calendar day and times the ramp is closed.**

**Support:**

The Day/Month (SC6A(CA)) plaque is used on the RAMP CLOSED (SC6-3(CA) and SC6-4(CA)) signs, to provide the appropriate day of the week and month a freeway or expressway entrance or exit ramp is closed.

The Time (SC6B(CA)) plaque is used on the RAMP CLOSED (SC6-3(CA) and SC6-4(CA)) signs, to provide the appropriate time of the day a freeway or expressway entrance or exit ramp is closed.

**Option:**

The RAMP CLOSED, USE RAMP AT \_\_\_ (SC7(CA)) sign may be used in lieu of the RAMP CLOSED (R11-2 sign, alternate message per Section 6F.08) sign and USE NEXT EXIT (C38(CA)) signs as shown on Department of Transportation's Standard Plan T-14 to inform motorists of a closed entrance or exit ramp and to provide an alternate route. See Section 1A.11 for information regarding these publication.

**Guidance:**

The \_\_\_ EXIT – RAMP CLOSED (SC8(CA)) sign should be used to inform motorists of a closed exit ramp.

**Standard:**

**The SC8(CA) sign shall be placed on the right shoulder, upstream of the preceding exit ramp.**

### **Section 6F.29 Flagger Sign (W20-7a, W20-7)**

**Guidance:**

The ~~Flagger (W20-7a) symbol sign (see Figure 6F-4, Sheet 3 of 4)~~ California Flagger symbol (C9A(CA)) sign should be used in advance of any point where a flagger is stationed to control road users.

**Option:**

A distance legend may be displayed on a supplemental plaque below the Flagger sign. The sign may be used with appropriate legends or in conjunction with other warning signs, such as the BE PREPARED TO STOP (W3-4) sign (see Figure 6F-4, Sheet 1 of 4).

The FLAGGER (W20-7) word message sign with distance legends may be substituted for the ~~Flagger (W20-7a) symbol sign~~ California Flagger symbol (C9A(CA)) sign.

**Standard:**

**The Flagger sign shall be removed, covered, or turned away from road users when the flagging operations are not occurring.**

**The MUTCD Flagger symbol (W20-7a) sign shall not be used, the California Flagger symbol (C9A(CA)) sign shall be used, instead.**

### **Section 6F.30 Two-Way Traffic Sign (W6-3)**

**Guidance:**

When one roadway of a normally divided highway is closed, with two-way vehicular traffic maintained on the other roadway, the Two-Way Traffic (W6-3) sign (see Figure 6F-4, Sheet 2 of 4) should be used at the beginning of the two-way vehicular traffic section and at intervals to remind road users of opposing vehicular traffic.

**Guidance:**

The Two-Way Traffic (W6-3) sign should also be used at locations where motorists could perceive that they are on a one-way roadway when, in fact, they are on a two lane, two-way highway.

**Support:**

Following are some typical situations:

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

### **Section 6F.31 Workers Sign (W21-1, W21-1a)**

**Option:**

A Workers (W21-1a) symbol sign (see Figure 6F-4, Sheet 3 of 4) may be used to alert road users of workers in or near the roadway.

**Guidance:**

In the absence of other warning devices, a Workers symbol sign should be used when workers are in the roadway.

**Option:**

The WORKERS (W21-1) word message sign may be used as an alternate to the Workers (W21-1a) symbol sign.

### **Section 6F.32 FRESH OIL (TAR) Sign (W21-2)**

**Guidance:**

The FRESH OIL (TAR) (W21-2) sign (see Figure 6F-4, Sheet 3 of 4) should be used to warn road users of the surface treatment.

### **Section 6F.33 ROAD MACHINERY AHEAD Sign (W21-3)**

**Option:**

The ROAD MACHINERY AHEAD (W21-3) sign (see Figure 6F-4, Sheet 3 of 4) may be used to warn of machinery operating in or adjacent to the roadway.

### **Section 6F.34 Motorized Traffic Signs (W8-6, W11-10)**

**Option:**

Motorized Traffic (W8-6, W11-10) signs may be used to alert road users to locations where unexpected travel on the roadway or entries into or departures from the roadway by construction vehicles might occur. The TRUCK CROSSING (W8-6) word message sign may be used as an alternate to the Truck Crossing symbol (W11-10) sign (see Figure 6F-4, Sheet 2 of 4) where there is an established construction vehicle crossing of the roadway.

**Support:**

These locations might be relatively confined or might occur randomly over a segment of roadway.

### **Section 6F.35 Shoulder Work Signs (W21-5, W21-5a)**

**Support:**

Shoulder Work signs (see Figure 6F-4, Sheets 3 and 4 of 4) warn of maintenance, reconstruction, or utility operations on the highway shoulder where the roadway is unobstructed.

**Standard:**

**The Shoulder Work sign shall have the legend SHOULDER WORK (W21-5), RIGHT (LEFT) SHOULDER CLOSED (W21-5a), or RIGHT (LEFT) SHOULDER CLOSED XXX ~~m~~(FT) or AHEAD (W21-5b) or SHOULDER WORK AHEAD (C24(CA)).**

**Option:**

The Shoulder Work sign may be used in advance of the point on a nonlimited access highway where there is shoulder work. It may be used singly or in combination with a ROAD WORK NEXT X ~~km~~ (MILES) or ROAD WORK AHEAD sign.

**Guidance:**

On freeways and expressways, the RIGHT (LEFT) SHOULDER CLOSED XXX ~~m~~ (FT) or AHEAD (W21-5b) sign followed by RIGHT (LEFT) SHOULDER CLOSED (W21-5a) sign should be used in advance of the point where the shoulder work occurs and should be preceded by a ROAD WORK AHEAD sign.

**Option:**

The SHOULDER WORK AHEAD (C24(CA)) sign may be used in advance of the point where maintenance, reconstruction, or utility operations involve the shoulder but the roadway is unobstructed.

The SHOULDER CLOSED (C30A(CA)) sign may be used within a shoulder area that has been closed due to work near the traveled way. The C30A(CA) sign is supplemental to appropriate advance warning signs.

**Section 6F.36 SURVEY CREW Sign (W21-6)**

**Guidance:**

The SURVEY CREW (W21-6) sign (see Figure 6F-4, Sheet 4 of 4) should be used to warn of surveying crews working in or adjacent to the roadway.

**Section 6F.37 UTILITY WORK Sign (W21-7)**

**Option:**

The UTILITY WORK (W21-7) sign (see Figure 6F-4, Sheet 4 of 4) may be used as an alternate to the ROAD (STREET) WORK (W20-1) sign for utility operations on or adjacent to a highway.

**Support:**

Typical examples of where the UTILITY WORK sign is used appear in Figures ~~6H-4~~ 6H-4(CA), 6H-6, ~~6H-10~~ 6H-10(CA), 6H-15, 6H-18, 6H-21, 6H-22, 6H-26, and 6H-33.

**Standard:**

**The UTILITY WORK sign shall carry the legend UTILITY WORK, XX ~~m~~ (FT), XX ~~km~~ (MILES), or AHEAD.**

**Section 6F.38 Signs for Blasting Areas**

**Support:**

Radio-Frequency (RF) energy can cause the premature firing of electric detonators (blasting caps) used in TTC zones.

**Standard:**

**Road users shall be warned to turn off mobile radio transmitters and cellular telephones where blasting operations occur. A sequence of signs shall be prominently displayed to direct operators of mobile radio equipment, including cellular telephones, to turn off transmitters in a blasting area. These signs shall be covered or removed when there are no explosives in the area or the area is otherwise secured.**

**Section 6F.39 BLASTING ZONE AHEAD Sign (W22-1)**

**Standard:**

**The BLASTING ZONE AHEAD (W22-1) sign (see Figure 6F-4, Sheet 4 of 4) shall be used in advance of any TTC zone where explosives are being used. The TURN OFF 2-WAY RADIO AND CELL PHONE and END BLASTING ZONE signs shall be used in sequence with this sign.**

#### **Section 6F.40 TURN OFF 2-WAY RADIO AND CELL PHONE Sign (W22-2)**

**Standard:**

The **TURN OFF 2-WAY RADIO AND CELL PHONE (W22-2)** sign (see **Figure 6F-4, Sheet 4 of 4**) shall follow the **BLASTING ZONE AHEAD** sign and shall be placed at least **300 m (1,000 ft)** before the beginning of the blasting zone.

#### **Section 6F.41 END BLASTING ZONE Sign (W22-3)**

**Standard:**

The **END BLASTING ZONE (W22-3)** sign (see **Figure 6F-4, Sheet 4 of 4**) shall be placed a **minimum of 300 m (1,000 ft)** past the blasting zone.

**Option:**

The **END BLASTING ZONE** sign may be placed either with or preceding the **END ROAD WORK** sign.

#### **Section 6F.42 Shoulder Signs (W8-4, W8-9, W8-9a)**

**Option:**

The **SOFT SHOULDER (W8-4)** sign (see **Figure 6F-4, Sheet 2 of 4**) may be used to warn of a soft shoulder condition.

The **LOW SHOULDER (W8-9)** sign (see **Figure 6F-4, Sheet 2 of 4**) may be used to warn of a shoulder condition where there is an elevation difference of less than **75 mm (3 in)** between the shoulder and the travel lane.

**Guidance:**

The **SHOULDER DROP OFF (W8-9a)** sign (see **Figure 6F-4, Sheet 2 of 4**) should be used when an unprotected shoulder drop-off, adjacent to the travel lane, exceeds **75 mm (3 in)** in depth for a continuous length along the roadway, based on engineering judgment.

**Option:**

The **NO SHOULDER (C31A(CA))** sign may be used where no earth, gravel or paved shoulders are available for vehicles to pull off the roadway.

#### **Section 6F.43 UNEVEN LANES Sign (W8-11)**

**Guidance:**

The **UNEVEN LANES (W8-11)** sign (see **Figure 6F-4, Sheet 2 of 4**) should be used during operations that create a difference in elevation between adjacent lanes that are open to travel of **50 mm (2 in) or more**.

#### **Section 6F.44 NO CENTER STRIPE Sign (W8-12)**

**Guidance:**

The **NO CENTER STRIPE (W8-12)** sign (see **Figure 6F-4, Sheet 2 of 4**) should be used when the work obliterates the centerline pavement markings. This sign should be placed at the beginning of the **TTC zone** and repeated at **3.2 km (2 mi)** intervals in long **TTC zones**.

**Standard:**

The **NO CENTER STRIPE (W8-12)** sign shall not be used on State highways. Whenever construction or maintenance work causes obliteration of center stripe, temporary or permanent center stripe shall be in place prior to opening the State highway to public traffic.

#### **Section 6F.45 Double Reverse Curve Signs (W24 Series)**

**Option:**

The **Double Reverse Curve (W24-1, ~~W24-1a, or W24-1b~~)** sign (see **Figure 6F-4, Sheet 4 of 4**) may be used when the tangent distance between two reverse curves is less than **180 m (600 ft)**, thus making it difficult for a second **Reverse Curve (W1-4 Series)** sign to be placed between the curves.

**Standard:**

**If a Double Reverse Curve sign is used, the number of lanes illustrated on the sign shall be the same as the number of through lanes available to road users, and the direction of the double reverse curve shall be appropriately illustrated.**

### **Section 6F.46 Other Warning Signs**

**Option:**

Advance warning signs may be used by themselves or with other advance warning signs.

Besides the warning signs specifically related to TTC zones, several other warning signs in Part 2 may apply in TTC zones.

**Standard:**

**Except as noted in Section 6F.02, other warning signs that are used in TTC zones shall have black legends and borders on an orange background.**

### **Section 6F.47 Special Warning Signs**

**Option:**

Special warning signs may be used based on engineering judgment.

**Guidance:**

Special warning signs should conform to the general requirements of color, shape, and alphabet size and series. The sign message should be brief, legible, and clear.

### **Section 6F.48 Advisory Speed Plaque (W13-1)**

**Option:**

In combination with a warning sign, an Advisory Speed (W13-1) plaque (see Figure 6F-4, Sheet 2 of 4) may be used to indicate a recommended safe speed through the TTC zone.

**Standard:**

**The Advisory Speed plaque shall not be used in conjunction with any sign other than a warning sign, nor shall it be used alone. When used with orange TTC zone signs, this plaque shall have a black legend and border on an orange background. The sign shall be at least 600 x 600 mm (24 x 24 in) in size when used with a sign that is 900 x 900 mm (36 x 36 in) or larger. Except in emergencies, an Advisory Speed plaque shall not be mounted until the recommended speed is determined by the highway agency.**

### **Section 6F.49 Supplementary Distance Plaque (W7-3a)**

**Option:**

In combination with a warning sign, a Supplementary Distance (W7-3a) plaque with the legend NEXT XX ~~km~~ (MILES) may be used to indicate the length of highway over which a work activity is being conducted, or over which a condition exists in the TTC zone.

In long TTC zones, Supplementary Distance plaques with the legend NEXT XX ~~km~~ (MILES) may be placed in combination with warning signs at regular intervals within the zone to indicate the remaining length of highway over which the TTC work activity or condition exists.

**Standard:**

**The Supplementary Distance plaque with the legend NEXT XX ~~km~~ (MILES) shall not be used in conjunction with any sign other than a warning sign, nor shall it be used alone. When used with orange TTC zone signs, this plaque shall have a black legend and border on an orange background. The sign shall be at least 750 x 600 mm (30 x 24 in) in size when used with a sign that is 900 x 900 mm (36 x 36 in) or larger.**

**Guidance:**

When used in TTC zones, the Supplementary Distance plaque with the legend NEXT XX ~~km~~ (MILES) should be placed below the initial warning sign designating that, within the approaching zone, a temporary work activity or condition exists.

**Option:**

The XXX FT (C29(CA)) plaque may be used on the face of a warning sign to indicate the length of highway over which a work activity is being conducted, or over which a condition exists in the TTC zone.

### **Section 6F.50 Guide Signs**

#### Support:

Guide signs along highways provide road users with information to help them along their way through the TTC zone. The design of guide signs is presented in Part 2.

#### Guidance:

The following guide signs should be used in TTC zones as needed:

- A. Standard route markings, where temporary route changes are necessary;
- B. Directional signs and street name signs; and
- C. Special guide signs relating to the condition or work being done.

#### **Standard:**

**If additional temporary guide signs are used in TTC zones, they shall have a black legend and border on an orange background.**

#### Option:

Guide signs used in TTC incident management situations may have a black legend and border on a fluorescent pink background.

When directional signs and street name signs are used in conjunction with detour routing, these signs may have a black legend and border on an orange background.

When permanent directional signs or permanent street name signs are used in conjunction with detour signing, they may have a white legend on a green background.

### **Section 6F.51 ROAD WORK NEXT XX km (MILES) Sign (G20-1)**

#### Guidance:

The ROAD WORK NEXT XX ~~km~~ (MILES) (G20-1) sign (see Figure 6F-4, Sheet 4 of 4) should be installed in advance of TTC zones that are more than 3.2 km (2 mi) in length.

#### Option:

The ROAD WORK NEXT XX ~~km~~ (MILES) sign may be mounted on a Type III barricade. The sign may also be used for TTC zones of shorter length.

#### **Standard:**

**The distance shown on the ROAD WORK NEXT XX ~~km~~ (MILES) sign shall be stated to the nearest whole kilometer (or mile).**

#### Option:

The word STATE HIGHWAY may be substituted for ROAD, where applicable.

The word CONSTRUCTION may be substituted for WORK, where applicable.

### **Section 6F.52 END ROAD WORK Sign (G20-2)**

#### Guidance:

When used, the END ROAD WORK (G20-2) sign (see Figure 6F-4, Sheet 4 of 4) should be placed near the end of the termination area, as determined by engineering judgment.

#### Option:

The END ROAD WORK sign may be installed on the back of a warning sign facing the opposite direction of road users or on the back of a Type III barricade.

#### Option:

The END ROAD WORK (G20-2) sign may not be used if the end of the work zone is obvious to motorists or falls within a larger project's limits.

Conditions may be such that posting of END ROAD WORK (G20-2) signs is not helpful. For example, they should normally not be used if other TTC zones begin within 1.6 km (1 mi) of the end of the workspace in rural areas, or about 0.4 km (0.25 mi) within urban areas. For normal daytime maintenance operations, the G20-2 sign is optional.

### **Section 6F.53 Detour Signs (M4-8, M4-8a, M4-8b, M4-9, M4-9a, M4-9b, M4-9c, and M4-10)**

#### **Standard:**

**Each detour shall be adequately marked with standard temporary route signs and destination signs.**

**Option:**

Detour signs in TTC incident management situations may have a black legend and border on a fluorescent pink background.

The Detour Arrow (M4-10) sign (see Figure 6F-5) may be used where a detour route has been established.

The DETOUR (M4-8) sign (see Figure 6F-5) may be mounted at the top of a route sign assembly to mark a temporary route that detours from a highway, bypasses a section closed by a TTC zone, and rejoins the highway beyond the TTC zone.

**Guidance:**

The Detour Arrow (M4-10) sign should normally be mounted just below the ROAD CLOSED (R11-2, R11-3a, or R11-4) sign. The Detour Arrow sign should include a horizontal arrow pointed to the right or left as required.

The DETOUR (M4-9) sign (see Figure 6F-5) should be used for unnumbered highways, for emergency situations, for periods of short durations, or where, over relatively short distances, road users are guided along the detour and back to the desired highway without route signs.

A Street Name sign should be placed above, or the street name should be incorporated into, a DETOUR (M4-9) sign to indicate the name of the street being detoured.

**Option:**

The END DETOUR (M4-8a) or END (M4-8b) sign (see Figure 6F-5) may be used to indicate that the detour has ended.

**Guidance:**

When the END DETOUR sign is used on a numbered highway, the sign should be mounted above a sign after the end of the detour.

The Pedestrian/Bicycle Detour (M4-9a) sign (see Figure 6F-5) should be used where a pedestrian/bicycle detour route has been established because of the closing of a pedestrian/bicycle facility to through traffic.

**Standard:**

**If used, the Pedestrian/Bicycle Detour sign shall have an arrow pointing in the appropriate direction.**

**Option:**

The arrow on a Pedestrian/Bicycle Detour sign may be on the sign face or on a supplemental plaque.

The Pedestrian Detour (M4-9b) sign or Bicycle Detour (M4-9c) sign (see Figure 6F-5) may be used where a pedestrian or bicycle detour route (not both) has been established because of the closing of the pedestrian or bicycle facility to through traffic.

**Guidance:**

The DETOUR (M4-8) sign should be placed on tangent sections at intervals not to exceed 400 m (1300 ft) and at major intersections.

**Option:**

In urban areas, the M4-8 signs may be placed at every intersection.

**Guidance:**

The DETOUR with Arrow (SC3(CA)) sign should be used for unnumbered highways, for emergency situations, for periods of short duration, or where, over relatively short distances, road users are guided along the detour and back to the desired highway without route markers.

The FWY DETOUR with Arrow (SC9(CA)) sign should be used to inform motorists of the direction to follow for a freeway detour.

**Section 6F.54 PILOT CAR FOLLOW ME Sign (G20-4)**

**Standard:**

**The PILOT CAR FOLLOW ME (G20-4) sign (see Figure 6F-4, Sheet 4 of 4) shall be mounted in a conspicuous position on the rear of a vehicle used for guiding one-way vehicular traffic through or around a TTC zone. A flagger shall be stationed on the approach to the activity area to stop vehicular traffic until the pilot vehicle is available.**

Guidance:

The TRAFFIC CONTROL – WAIT AND FOLLOW PILOT CAR (C37(CA)) sign should be used at intersecting approaches to a work zone when pilot cars are controlling reversible lane traffic.

**Section 6F.55 Portable Changeable Message Signs**

**Standard:**

**Portable Changeable Message signs shall be TTC devices with the flexibility to display a variety of messages. Each message shall consist of either one or two phases. A phase shall consist of up to three lines of eight characters per line. Each character module shall use at least a five wide and seven high pixel matrix.**

**Support:**

Portable Changeable Message signs are used most frequently on high-density urban freeways, but have applications on all types of highways where highway alignment, road user routing problems, or other pertinent conditions require advance warning and information.

Portable Changeable Message signs have a wide variety of applications in TTC zones including: roadway, lane, or ramp closures, crash or emergency incident management, width restriction information, speed control or reductions, advisories on work scheduling, road user management and diversion, warning of adverse conditions or special events, and other operational control.

The primary purpose of Portable Changeable Message signs in TTC zones is to advise the road user of unexpected situations. Some typical applications include the following:

- A. Where the speed of vehicular traffic is expected to drop substantially;
- B. Where significant queuing and delays are expected;
- C. Where adverse environmental conditions are present;
- D. Where there are changes in alignment or surface conditions;
- E. Where advance notice of ramp, lane, or roadway closures is needed;
- F. Where crash or incident management is needed; and/or
- G. Where changes in the road user pattern occur.

**Guidance:**

The components of a Portable Changeable Message sign should include: a message sign panel, control systems, a power source, and mounting and transporting equipment.

Portable Changeable Message signs should subscribe to the principles established in Section 2A.07 and other sections of this Manual and, to the extent practical, with the design (that is, color, letter size and shape, and borders) and applications prescribed in this Manual, except that the reverse colors for the letters and the background are considered acceptable.

The front face of the sign should be covered with a protective material. The color of the elements should be yellow or orange on a black background.

Portable Changeable Message signs should be visible from 800 m (0.5 mi) under both day and night conditions. For a trailer or large truck mounted sign, the letter height should be a minimum of 450 mm (18 in). For Changeable Message signs mounted on service patrol trucks, the letter height should be a minimum of 250 mm (10 in).

The message panel should have adjustable display rates (minimum of 3 seconds per phase), so that the entire message can be read at least twice at the posted speed, the off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed.

Messages should be designed taking into account the following factors:

- A. Each phase should convey a single thought.
- B. If the message can be displayed in one phase, the top line should present the problem, the center line should present the location or distance ahead, and the bottom line should present the recommended driver action.
- C. The message should be as brief as possible.
- D. When a message is longer than two phases, additional Portable Changeable Message signs should be used.
- E. When abbreviations are used, they should be easily understood (see Section 1A.14).

**Option:**

The message sign panel may vary in size.

Smaller letter sizes may be used on a Portable Changeable Message sign mounted on a trailer or large truck provided that the message is legible from at least 200 m (650 ft), or mounted on a service patrol truck provided that the message is legible from at least 100 m (330 ft).

Two Portable Changeable Message signs may be used for the purpose of allowing the entire message to be read twice at the posted speed.

**Standard:**

**Portable Changeable Message signs shall automatically adjust their brightness under varying light conditions, to maintain legibility.**

**The control system shall include a display screen upon which messages can be reviewed before being displayed on the message sign. The control system shall be capable of maintaining memory when power is unavailable.**

**Portable Changeable Message signs shall be equipped with a power source and a battery back-up to provide continuous operation when failure of the primary power source occurs.**

**The mounting of Portable Changeable Message signs on a trailer, a large truck, or a service patrol truck shall be such that the bottom of the message sign panel shall be a minimum of 2.1 m (7 ft) above the roadway in urban areas and 1.5 m (5 ft) above the roadway in rural areas when it is in the operating mode.**

**The text of the messages shall not scroll or travel horizontally or vertically across the face of the sign.**

**Guidance:**

Portable Changeable Message signs should be used as a supplement to and not as a substitute for conventional signs and pavement markings.

When Portable Changeable Message signs are used for route diversion, they should be placed far enough in advance of the diversion to allow road users ample opportunity to perform necessary lane changes, to adjust their speed, or to exit the affected highway.

The Portable Changeable Message signs should be sited and aligned to provide maximum legibility. Multiple Portable Changeable Message signs should be placed on the same side of the roadway, separated from each other at distances based on Table 6C-1.

Portable Changeable Message signs should be placed on the shoulder of the roadway or, if practical, further from the traveled lane. They should be delineated with retroreflective TTC devices. When Portable Changeable Message signs are not being used, they should be removed; if not removed, they should be shielded; or if the previous two options are not feasible, they should be delineated with retroreflective TTC devices.

Portable Changeable Message sign trailers should be delineated on a permanent basis by affixing retroreflective material, known as conspicuity material, in a continuous line on the face of the trailer as seen by oncoming road users. If the sign trailer is located within 4.6 m (15 ft) of the edge of the traveled way, it should be delineated with a taper consisting of 9 cones placed at a spacing of 7.5 m (25 ft) apart.

**Standard:**

**On State highways, the message displayed on Portable Changeable Message signs shall be visible from a distance of 460 m (1500 ft) and shall be legible from a distance of 230 m (750 ft), at noon on a cloudless day, by persons with vision of or corrected to 20/20.**

**Guidance:**

On local roads, the message displayed on Portable Changeable Message signs should be visible from a distance of 460 m (1500 ft) and shall be legible from a distance of 230 m (750 ft), at noon on a cloudless day, by persons with vision of or corrected to 20/20.

**Support:**

Refer to Department of Transportation's Standard Specifications Section 12-3.12 for visibility criteria cited. See Section 1A.11 for information regarding this publication.

Refer to Section 2B.13 for Vehicle Speed Feedback Signs.

### **Section 6F.56 Arrow Panels**

#### **Standard:**

**An arrow panel shall be a sign with a matrix of elements capable of either flashing or sequential displays. This sign shall provide additional warning and directional information to assist in merging and controlling road users through or around a TTC zone.**

#### **Guidance:**

An arrow panel in the arrow or chevron mode should be used to advise approaching traffic of a lane closure along major multi-lane roadways in situations involving heavy traffic volumes, high speeds, and/or limited sight distances, or at other locations and under other conditions where road users are less likely to expect such lane closures.

If used, an arrow panel should be used in combination with appropriate signs, channelizing devices, or other TTC devices.

An arrow panel should be placed on the shoulder of the roadway or, if practical, further from the traveled lane. It should be delineated with retroreflective TTC devices. When an arrow panel is not being used, it should be removed; if not removed, it should be shielded; or if the previous two options are not feasible, it should be delineated with retroreflective TTC devices.

#### **Standard:**

**Arrow panels shall meet the minimum size, legibility distance, number of elements, and other specifications shown on Figure 6F-6.**

#### **Support:**

Type A arrow panels are appropriate for use on low-speed urban streets. Type B arrow panels are appropriate for intermediate-speed facilities and for maintenance or mobile operations on high-speed roadways. Type C arrow panels are intended to be used on high-speed, high-volume motor vehicle traffic control projects. Type D arrow panels are intended for use on authorized vehicles.

#### **Standard:**

**Type A, B, and C arrow panels shall have solid rectangular appearances. A Type D arrow panel shall conform to the shape of the arrow.**

**All arrow panels shall be finished in nonreflective black. The arrow panel shall be mounted on a vehicle, a trailer, or other suitable support.**

#### **Guidance:**

The minimum mounting height of an arrow panel should be 2.1 m (7 ft) from the roadway to the bottom of the panel, except on vehicle-mounted panels, which should be as high as practical.

A vehicle-mounted arrow panel should be provided with remote controls.

#### **Standard:**

**Arrow panel elements shall be capable of at least a 50 percent dimming from full brilliance. The dimmed mode shall be used for nighttime operation of arrow panels.**

#### **Guidance:**

Full brilliance should be used for daytime operation of arrow panels.

#### **Standard:**

**The arrow panel shall have suitable elements capable of the various operating modes. The color presented by the elements shall be yellow.**

#### **Guidance:**

If an arrow panel consisting of a bulb matrix is used, the elements should be recess-mounted or equipped with an upper hood of not less than 180 degrees.

#### **Standard:**

**The minimum element on-time shall be 50 percent for the flashing mode, with equal intervals of 25 percent for each sequential phase. The flashing rate shall be not less than 25 nor more than 40 flashes per minute.**

**An arrow panel shall have the following three mode selections:**

- A. A Flashing Arrow, Sequential Arrow, or Sequential Chevron mode; and**
- B. A flashing Double Arrow mode; and**
- C. A flashing Caution mode.**

**An arrow panel in the arrow or chevron mode shall be used only for stationary or moving lane closures on multi-lane roadways.**

**For shoulder work, blocking the shoulder, for roadside work near the shoulder, or for temporarily closing one lane on a two-lane, two-way roadway, an arrow panel shall be used only in the caution mode.**

Guidance:

For a stationary lane closure, the arrow panel should be located on the shoulder at the beginning of the merging taper.

Where the shoulder is narrow, the arrow panel should be located in the closed lane.

**Standard:**

**When arrow panels are used to close multiple lanes, a separate arrow panel shall be used for each closed lane.**

Guidance:

When arrow panels are used to close multiple lanes, if the first arrow panel is placed on the shoulder, the second arrow panel should be placed in the first closed lane at the beginning of the second merging taper (see Figure 6H-37). When the first arrow panel is placed in the first closed lane, the second arrow panel should be placed in the second closed lane at the downstream end of the second merging taper.

For mobile operations where a lane is closed, the arrow panel should be located to provide adequate separation from the work operation to allow for appropriate reaction by approaching drivers.

**Standard:**

**A vehicle displaying an arrow panel shall be equipped with high-intensity rotating, flashing, oscillating, or strobe lights.**

**Arrow panel(s) shall not be used to laterally shift traffic.**

Option:

A portable changeable message sign may be used to simulate an arrow panel display.

**Standard:**

**The arrow panel shall be located behind any channelizing devices used to transition traffic from the closed lane.**

Support:

Department of Transportation's Standard Specifications for flashing arrow panels are in Section 12-3.03. See Section 1A.11 for information regarding this publication.

**Standard:**

**The minimum legibility distance is the distance at which flashing arrow panels shall be legible at noon on a cloudless day and at night by persons with vision of or corrected to 20/20.**

Support:

Refer to Department of Transportation's Standard Specifications Section 12-3.03 for visibility criteria cited. See Section 1A.11 for information regarding this publication.

### **Section 6F.57 High-Level Warning Devices (Flag Trees)**

Option:

A high-level warning device (flag tree) may supplement other TTC devices in TTC zones.

Support:

A high-level warning device is designed to be seen over the top of typical passenger cars. A typical high-level warning device is shown in Figure 6F-2.

**Standard:**

**A high-level warning device shall consist of a minimum of two flags with or without a Type B high-intensity flashing warning light. The distance from the roadway to the bottom of the lens of the light and to the lowest point of the flag material shall be not less than 2.4 m (8 ft). The flag shall be 400 mm (16 in) square or larger and shall be orange or fluorescent red-orange in color.**

Option:

An appropriate warning sign may be mounted below the flags.

Support:

High-level warning devices are most commonly used in high-density road user situations to warn road users of short-term operations.

**Section 6F.58 Channelizing Devices**

**Standard:**

**Designs of various channelizing devices shall be as shown in Figure 6F-7.**

Support:

The function of channelizing devices is to warn road users of conditions created by work activities in or near the roadway and to guide road users. Channelizing devices include cones, tubular markers, vertical panels, drums, barricades, and temporary raised islands.

Channelizing devices provide for smooth and gradual vehicular traffic flow from one lane to another, onto a bypass or detour, or into a narrower traveled way. They are also used to separate vehicular traffic from the work space, pavement drop-offs, pedestrian or shared-use paths, or opposing directions of vehicular traffic.

**Standard:**

**Devices used to channelize pedestrians shall be detectable to users of long canes and visible to persons having low vision.**

**Where barricades are used to channelize pedestrians, there shall be continuous detectable bottom and top rails with no gaps between individual barricades to be detectable to users of long canes. The bottom of the bottom rail shall be no higher than 150 mm (6 in) above the ground surface. The top of the top rail shall be no lower than 900 mm (36 in) above the ground surface.**

Option:

A gap not exceeding 150 mm (6 in) between the bottom rail and the ground surface may be used to facilitate drainage.

**Standard:**

**If drums, cones, or tubular markers are used to channelize pedestrians, they shall be located such that there are no gaps between the bases of the devices, in order to create a continuous bottom, and the height of each individual drum, cone, or tubular marker shall be no less than 900 mm (36 in) to be detectable to users of long canes.**

Guidance:

Channelizing devices should be constructed and ballasted to perform in a predictable manner when inadvertently struck by a vehicle. Channelizing devices should be crashworthy. Fragments or other debris from the device or the ballast should not pose a significant hazard to road users or workers.

The spacing of channelizing devices should not exceed a distance in meters (feet) equal to 0.2 times the speed limit in km/h (1.0 times the speed limit in mph) when used for taper channelization, and a distance in meters (feet) equal to 0.4 times the speed limit in km/h (2.0 times the speed limit in mph) when used for tangent channelization.

When channelizing devices have the potential of leading vehicular traffic out of the intended vehicular traffic space as shown in Figure 6H-39, the channelizing devices should be extended a distance in meters (feet) of 0.4 times the speed limit in km/h (2.0 times the speed limit in mph) beyond the end of the transition area.

[The spacing of channelizing devices should not exceed the maximum distances shown in Table 6F-102\(CA\).](#)

Option:

Warning lights may be added to channelizing devices in areas with frequent fog, snow, or severe roadway curvature, or where visual distractions are present.

**Standard:**

**Warning lights shall flash when placed on channelizing devices used alone or in a cluster to warn of a condition. Warning lights placed on channelizing devices used in a series to channelize road users shall be steady-burn.**

**The retroreflective material used on channelizing devices shall have a smooth, sealed outer surface that will display a similar color day or night.**

Option:

The name and telephone number of the highway agency, contractor, or supplier may be shown on the nonretroreflective surface of all types of channelizing devices.

**Standard:**

**The letters and numbers of the name and telephone number shall be nonretroreflective and not over 50 mm (2 in) in height.**

Guidance:

Particular attention should be given to maintaining the channelizing devices to keep them clean, visible, and properly positioned at all times.

**Standard:**

**Devices that are damaged or have lost a significant amount of their retroreflectivity and effectiveness shall be replaced.**

**Section 6F.59 Cones**

**Standard:**

Cones (see Figure 6F-7, Sheet 1 of 2) shall be predominantly orange and shall be made of a material that can be struck without causing damage to the impacting vehicle. For daytime and low-speed roadways, cones shall be not less than 450 mm (18 in) in height. When cones are used on freeways and other high-speed highways or at night on all highways, or when more conspicuous guidance is needed, cones shall be a minimum of 700 mm (28 in) in height.

For nighttime use, cones shall be retroreflectorized or equipped with lighting devices for maximum visibility. Retroreflectorization of cones that are 700 to 900 mm (28 to 36 in) in height shall be provided by a 150 mm (6 in) wide white band located 75 to 100 mm (3 to 4 in) from the top of the cone and an additional 100 mm (4 in) wide white band located approximately 50 mm (2 in) below the 150 mm (6 in) band.

Retroreflectorization of cones that are more than 900 mm (36 in) in height shall be provided by horizontal, circumferential, alternating orange and white retroreflective stripes that are 100 to 150 mm (4 to 6 in) wide. Each cone shall have a minimum of two orange and two white stripes with the top stripe being orange. Any nonretroreflective spaces between the orange and white stripes shall not exceed 75 mm (3 in) in width.

Support:

The 900 mm (36 in) and 1050 mm (42 in) high cones provide additional conspicuity in visually complex environments and for older road users.

Option:

Traffic cones may be used to channelize road users, divide opposing vehicular traffic lanes, divide lanes when two or more lanes are kept open in the same direction, and delineate short duration maintenance and utility work.

Guidance:

Steps should be taken to minimize the possibility of cones being blown over or displaced by wind or moving vehicular traffic.

Cones should not be used for pedestrian channelization or as pedestrian barriers in TTC zones on or along sidewalks unless they are continuous between individual devices and detectable to users of long canes.

Option:

Cones may be doubled up to increase their weight.

Support:

Some cones are constructed with bases that can be filled with ballast. Others have specially weighted bases, or weight such as sandbag rings that can be dropped over the cones and onto the base to provide added stability.

Guidance:

Ballast should be kept to the minimum amount needed.

Option:

Retroreflectorization of 700 mm (28 in) or larger cones may be provided by a 325 mm (13 in) band (sleeve).

**Standard:**

On State highways, the retroreflectorized bands shall be visible at 300 m (1000 ft) at night under illumination of legal high beam headlights, by persons with vision of or corrected to 20/20.

**Guidance:**

On local roads, the retroreflectorized bands should be visible at 300 m (1000 ft) at night under illumination of legal high beam headlights, by persons with vision of or corrected to 20/20.

**Support:**

Refer to Department of Transportation's Standard Specifications Section 12-3.10 for visibility criteria cited. See Section 1A.11 for information regarding this publication.

**Section 6F.60 Tubular Markers**

**Standard:**

Tubular markers (see Figure 6F-7, Sheet 1 of 2) shall be predominantly orange and shall be not less than 450 mm (18 in) high and 50 mm (2 in) wide facing road users. They shall be made of a material that can be struck without causing damage to the impacting vehicle.

Tubular markers shall be a minimum of 700 mm (28 in) in height when they are used on freeways and other high-speed highways, on all highways during nighttime, or whenever more conspicuous guidance is needed.

For nighttime use, tubular markers shall be retroreflectorized. Retroreflectorization of 700 mm (28 in) or larger tubular markers shall be provided by two 75 mm (3 in) wide white bands placed a maximum of 50 mm (2 in) from the top with a maximum of 150 mm (6 in) between the bands.

**Support:**

The 1050 mm (42 in) high tubular markers provide additional conspicuity in visually complex environments and for older road users.

**Guidance:**

Tubular markers should not be used for pedestrian channelization or as pedestrian barriers in TTC zones on or along sidewalks unless they are continuous between individual devices and detectable to users of long canes.

Tubular markers have less visible area than other devices and should be used only where space restrictions do not allow for the use of other more visible devices.

Tubular markers should be stabilized by affixing them to the pavement, by using weighted bases, or weights such as sandbag rings that can be dropped over the tubular markers and onto the base to provide added stability. Ballast should be kept to the minimum amount needed.

**Option:**

Tubular markers may be used effectively to divide opposing lanes of road users, divide vehicular traffic lanes when two or more lanes of moving motor vehicle traffic are kept open in the same direction, and to delineate the edge of a pavement drop off where space limitations do not allow the use of larger devices.

**Standard:**

When a noncylindrical tubular marker is used, it shall be attached to the pavement in a manner such that the width facing road users meets the minimum requirements.

A tubular marker shall be attached to the pavement to display the minimum 50 mm (2 in) width to the approaching road users.

On State highways, the retroreflectorized bands shall be visible at 300 m (1000 ft) at night under illumination of legal high beam headlights, by persons with vision of or corrected to 20/20.

**Guidance:**

On local roads, the retroreflectorized bands should be visible at 300 m (1000 ft) at night under illumination of legal high beam headlights, by persons with vision of or corrected to 20/20.

**Support:**

Refer to Department of Transportation's Standard Specifications Section 12-3.04 for visibility criteria cited. See Section 1A.11 for information regarding this publication.

### **Section 6F.61 Vertical Panels**

#### **Standard:**

Vertical panels (see Figure 6F-7, Sheet 1 of 2) shall be 200 to 300 mm (8 to 12 in) in width and at least 600 mm (24 in) in height. They shall have orange and white diagonal stripes and be retroreflectorized.

Vertical panels shall be mounted with the top a minimum of 900 mm (36 in) above the roadway.

Where the height of the vertical panel itself is 900 mm (36 in) or greater, a panel stripe width of 150 (6 in) shall be used.

#### **Guidance:**

Vertical panels should be a minimum of 300 mm (12 in) in width.

#### **Option:**

Where the height of the vertical panel itself is less than 900 mm (36 in), a panel stripe width of 100 mm (4 in) may be used.

#### **Standard:**

Markings for vertical panels shall be alternating orange and white retroreflective stripes, sloping downward at an angle of 45 degrees in the direction vehicular traffic is to pass. Vertical panels used on freeways, expressways, and other high-speed roadways shall have a minimum of 169,000 mm<sup>2</sup> (270 in<sup>2</sup>) retroreflective area facing vehicular traffic.

#### **Option:**

Where space is limited, vertical panels may be used to channelize vehicular traffic, divide opposing lanes, or replace barricades.

### **Section 6F.62 Drums**

#### **Standard:**

Drums (see Figure 6F-7, Sheet 1 of 2) used for road user warning or channelization shall be constructed of lightweight, deformable materials. They shall be a minimum of 900 mm (36 in) in height and have at least a 450 mm (18 in) minimum width regardless of orientation. Metal drums shall not be used. The markings on drums shall be horizontal, circumferential, alternating orange and white retroreflective stripes 100 to 150 mm (4 to 6 in) wide. Each drum shall have a minimum of two orange and two white stripes with the top stripe being orange. Any nonretroreflectorized spaces between the horizontal orange and white stripes shall not exceed 75 mm (3 in) wide. Drums shall have closed tops that will not allow collection of construction debris or other debris.

#### **Support:**

Drums are highly visible, have good target value, give the appearance of being formidable obstacles and, therefore, command the respect of road users. They are portable enough to be shifted from place to place within a TTC zone in order to accommodate changing conditions, but are generally used in situations where they will remain in place for a prolonged period of time.

#### **Option:**

Although drums are most commonly used to channelize or delineate road user flow, they may also be used alone or in groups to mark specific locations.

#### **Guidance:**

Drums should not be used for pedestrian channelization or as pedestrian barriers in TTC zones on or along sidewalks unless they are continuous between individual devices and detectable to users of long canes.

Drums should not be weighted with sand, water, or any material to the extent that would make them hazardous to road users or workers when struck. Drums used in regions susceptible to freezing should have drain holes in the bottom so that water will not accumulate and freeze causing a hazard if struck by a road user.

#### **Standard:**

**Ballast shall not be placed on the top of a drum.**

On State highways, the retroreflectorized bands shall be visible at 300 m (1000 ft) at night under illumination of legal high beam headlights, by persons with vision of or corrected to 20/20.

Guidance:

On local roads, the retroreflectorized bands should be visible at 300 m (1000 ft) at night under illumination of legal high beam headlights, by persons with vision of or corrected to 20/20.

Support:

Refer to Department of Transportation's Standard Specifications Section 12-3.04 for visibility criteria cited. See Section 1A.11 for information regarding this publication.

**Section 6F.63 Type I, II, or III Barricades**

Support:

A barricade is a portable or fixed device having from one to three rails with appropriate markings and is used to control road users by closing, restricting, or delineating all or a portion of the right-of-way.

As shown in Figure 6F-7, Sheet 2 of 2, barricades are classified as either Type I, Type II, or Type III.

**Standard:**

**Stripes on barricade rails shall be alternating orange and white retroreflective stripes sloping downward at an angle of 45 degrees in the direction road users are to pass. Except as noted in the Option, the stripes shall be 150 mm (6 in) wide.**

Guidance:

Stripes on barricade rails should slope downward at an angle of 45 degrees in the direction road users are to pass.

Option:

When rail lengths are less than 900 mm (36 in), 100 mm (4 in) wide stripes may be used.

**Standard:**

**The minimum length for Type I and Type II Barricades shall be 600 mm (24 in), and the minimum length for Type III Barricades shall be 1200 mm (48 in). Each barricade rail shall be 200 to 300 mm (8 to 12 in) wide. Barricades used on freeways, expressways, and other high-speed roadways shall have a minimum of 169,000 mm<sup>2</sup> (270 in<sup>2</sup>) of retroreflective area facing road users.**

Support:

The Type I and Type II Barricades, 900 mm (36 in) in length with each rail 300 mm (12 in) wide, provide additional conspicuity in visually complex environments and for older road users.

Guidance:

Where barricades extend entirely across a roadway, the stripes should slope downward in the direction toward which road users must turn.

Where both right and left turns are provided, the barricade stripes should slope downward in both directions from the center of the barricade or barricades.

Where no turns are intended, the stripes should be positioned to slope downward toward the center of the barricade or barricades.

Barricade rails should be supported in a manner that will allow them to be seen by the road user, and in a manner that provides a stable support that is not easily blown over or displaced.

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 1500 mm (60 in) throughout the entire length of the pedestrian pathway, a 1500 x 1500 mm (60 x 60 in) passing space should be provided at least every 60 m (200 ft) to allow individuals in wheelchairs to pass.

Barricade rail supports should not project into pedestrian circulation routes more than 100 mm (4 in) from the support between 675 mm (27 in) and 2000 mm (80 in) from the surface as described in Section 4.4.1 of the "Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)" (see Section 1A.11).

Option:

For Type I Barricades, the support may include other unstriped horizontal panels necessary to provide stability.

Guidance:

Barricades should be crashworthy as they are located adjacent to vehicular traffic flow and are subject to impact by errant vehicles.

On high-speed expressways or in other situations where barricades may be susceptible to overturning in the wind, ballasting should be used.

Option:

Sandbags may be placed on the lower parts of the frame or the stays of barricades to provide the required ballast.

**Standard:**

**Ballast shall not be placed on top of any striped rail. Barricades shall not be ballasted by nondeformable objects such as rocks or chunks of concrete. Ballast shall not extend into the accessible passage width of 1500 mm (60 in).**

Support:

Type I or Type II Barricades are intended for use in situations where road user flow is maintained through the TTC zone.

Option:

Barricades may be used alone or in groups to mark a specific condition or they may be used in a series for channelizing road users.

Type I Barricades may be used on conventional roads or urban streets.

Guidance:

Type II or Type III Barricades should be used on freeways and expressways or other high-speed roadways. Type III Barricades should be used to close or partially close a road.

Option:

Type III Barricades used at a road closure may be placed completely across a roadway or from curb to curb.

Guidance:

Where provision is made for access of authorized equipment and vehicles, the responsibility for Type III Barricades should be assigned to a person who will provide proper closure at the end of each work day.

Support:

When a highway is legally closed but access must still be allowed for local road users, barricades usually are not extended completely across the roadway.

**Standard:**

**A sign (see Section 6F.09) shall be installed with the appropriate legend concerning permissible use by local road users. Adequate visibility of the barricades from both directions shall be provided.**

Option:

Signs may be installed on barricades (see Section 6F.03).

**Section 6F.64 Direction Indicator Barricades**

**Standard:**

**The Direction Indicator Barricade (see Figure 6F-7, Sheet 2 of 2) shall consist of a One-Direction Large Arrow (W1-6) sign mounted above a diagonal striped, horizontally aligned, retroreflective rail.**

**The One-Direction Large Arrow (W1-6) sign shall be black on an orange background. The stripes on the bottom rail shall be alternating orange and white retroreflective stripes sloping downward at an angle of 45 degrees in the direction road users are to pass. The stripes shall be 100 mm (4 in) wide. The One-Direction Large Arrow (W1-6) sign shall be 600 x 300 mm (24 x 12 in). The bottom rail shall have a length of 600 mm (24 in) and a height of 200 mm (8 in).**

Guidance:

The Direction Indicator Barricade, including any associated ballast or lights, should be crashworthy.

Option:

The Direction Indicator Barricade may be used in tapers, transitions, and other areas where specific directional guidance to drivers is necessary.

Guidance:

If used, Direction Indicator Barricades should be used in series to direct the driver through the transition and into the intended travel lane.

**Section 6F.65 Temporary Traffic Barriers as Channelizing Devices**

Support:

Temporary traffic barriers are not TTC devices in themselves; however, when placed in a position identical to a line of channelizing devices and marked and/or equipped with appropriate channelization features to provide guidance and warning both day and night, they serve as TTC devices.

**Standard:**

**Temporary traffic barriers serving as TTC devices shall conform to requirements for such devices as set forth throughout Part 6.**

**Temporary traffic barriers shall not be used solely to channelize road users, but also to protect the work space (see Section 6F.81). If used to channelize vehicular traffic, the temporary traffic barrier shall be supplemented with delineation, pavement markings, or channelizing devices for improved daytime and nighttime visibility.**

Guidance:

Temporary traffic barriers should not be used for a merging taper except in low-speed urban areas. Temporary traffic barriers should not be used for a constricted/restricted TTC zone.

When it is necessary to use a temporary traffic barrier for a merging taper in low-speed urban areas or for a constricted/restricted TTC zone, the taper shall be delineated and the taper length should be designed to optimize road user operations considering the available geometric conditions.

When used for channelization, temporary traffic barriers should be of a light color for increased visibility.

Option:

Side reflectors with cube-corner lenses or top mounted reflectors (facing the driver) may be used on temporary traffic barriers.

Guidance:

If used, the spacing of these reflectors should not exceed a distance in meters (feet) equal to 0.2 times the speed limit in km/h (1.0 times the speed limit in mph) through the TTC zone.

**Section 6F.66 Longitudinal Channelizing Barricades**

Support:

Longitudinal channelizing barricades are lightweight, deformable channelizing devices that can be used singly as Type I, II, or III barricades, or connected so they are highly visible and have good target value.

Guidance:

When used as a barricade, longitudinal channelizing barricades should conform to the general size, color, stripe pattern, retroreflectivity, and placement characteristics established for the devices described in Chapter 6F.

Option:

Longitudinal channelizing barricades may be used instead of a line of cones, drums, or barricades.

Longitudinal channelizing barricades may be hollow and filled with water as a ballast.

Guidance:

If used, longitudinal channelizing barricades should be interlocked to delineate or channelize flow including pedestrian traffic control. The interlocking barricade wall should not have gaps that allow pedestrians or vehicles to stray from the channelizing path.

Support:

Longitudinal channelizing barricades are often located adjacent to traffic and therefore are subject to impact by errant vehicles.

Guidance:

Because of their vulnerable position, longitudinal channelizing barricades should be constructed of lightweight materials and be crashworthy.

Although longitudinal channelizing barricades might give the appearance of being formidable obstacles, they have not met the crashworthy requirements for temporary traffic barriers and, therefore, should not be used to shield pedestrians, including workers, from vehicle impacts or obstacles.

Option:

Longitudinal channelizing barricades may be used to channelize pedestrians.

### **Section 6F.67 Other Channelizing Devices**

Option:

Channelizing devices other than those described in this Chapter may be used in special situations based on an engineering study.

Guidance:

Other channelizing devices should conform to the general size, color, stripe pattern, retroreflection, and placement characteristics established for the devices described in this Chapter.

### **Section 6F.68 Detectable Edging for Pedestrians**

Support:

Individual channelizing devices, tape or rope used to connect individual devices, other discontinuous barriers and devices, and pavement markings are not detectable by persons with visual disabilities and are incapable of providing detectable path guidance on temporary or realigned sidewalks or other pedestrian facilities.

Guidance:

When it is determined that a facility should be accessible to and detectable by pedestrians with visual disabilities, a continuously detectable edging should be provided throughout the length of the facility such that it can be followed by pedestrians using long canes for guidance. This edging should protrude at least 150 mm (6 in) above the surface of the sidewalk or pathway, with the bottom of the edging a maximum of 62 mm (2.5 in) above the surface. This edging should be continuous throughout the length of the facility except for gaps at locations where pedestrians or vehicles will be turning or crossing. This edging should consist of a prefabricated or formed-in-place curbing or other continuous device that is placed along the edge of the sidewalk or walkway. This edging should be firmly attached to the ground or to other devices. Adjacent sections of this edging should be interconnected such that the edging is not displaced by pedestrian or vehicular traffic or work operations, and such that it does not constitute a hazard to pedestrians, workers, or other road users.

Support:

Examples of detectable edging for pedestrians include:

- A. Prefabricated lightweight sections of plastic, metal, or other suitable materials that are interconnected and fixed in place to form a continuous edge.
- B. Prefabricated lightweight sections of plastic, metal, or other suitable materials that are interconnected, fixed in place, and placed at ground level to provide a continuous connection between channelizing devices located at intervals along the edge of the sidewalk or walkway.
- C. Sections of lumber interconnected and fixed in place to form a continuous edge.
- D. Formed-in-place asphalt or concrete curb.
- E. Prefabricated concrete curb sections that are interconnected and fixed in place to form a continuous edge.
- F. Continuous temporary traffic barrier or longitudinal channelizing barricades placed along the edge of the sidewalk or walkway that provides a pedestrian edging at ground level.
- G. Chain link or other fencing equipped with a continuous bottom rail.

Guidance:

Detectable pedestrian edging should be orange, white, or yellow and should match the color of the adjacent channelizing devices or traffic control devices, if any are present.

### **Section 6F.69 Temporary Raised Islands**

#### **Standard:**

**Temporary raised islands shall be used only in combination with pavement striping and other suitable channelizing devices.**

#### **Option:**

A temporary raised island may be used to separate vehicular traffic flows in two-lane, two-way operations on roadways having a vehicular traffic volume range of 4,000 to 15,000 average daily traffic (ADT) and on freeways having a vehicular traffic volume range of 22,000 ADT to 60,000 ADT.

Temporary raised islands also may be used in other than two-lane, two-way operations where physical separation of vehicular traffic from the TTC zone is not required.

#### **Guidance:**

Temporary raised islands should have the basic dimensions of 100 mm (4 in) high by at least 450 mm (18 in) wide and have rounded or chamfered corners.

The temporary raised islands should not be designed in such a manner that they would cause a motorist to lose control of the vehicle if the vehicle inadvertently strikes the temporary raised island. If struck, pieces of the island should not be dislodged to the extent that they could penetrate the occupant compartment or involve other vehicles.

#### **Standard:**

**At pedestrian crossing locations, temporary raised islands shall have an opening or be shortened to provide at least a 1500 mm (60 in) wide pathway for the crossing pedestrian.**

### **Section 6F.70 Opposing Traffic Lane Divider**

#### **Support:**

Opposing traffic lane dividers are delineation devices used as center lane dividers to separate opposing vehicular traffic on a two-lane, two-way operation.

#### **Standard:**

**Opposing traffic lane dividers shall not be placed across pedestrian crossings.**

**The Opposing Traffic Lane Divider (W6-4) sign (see Figure 6F-4, Sheet 2 of 4) is an upright, retroreflective orange-colored sign placed on a flexible support and sized at least 300 mm (12 in) wide by 450 mm (18 in) high.**

#### **Guidance:**

The Opposing Traffic Lane Divider (W6-4) sign should only be used to supplement a channelizing device that is being used to separate opposing traffic in a maintenance or construction work zone.

### **Section 6F.71 Pavement Markings**

#### **Standard:**

**The provisions of this Section shall not be considered applicable for short-term, mobile, or incident management TTC zones.**

**Pavement markings shall be maintained along paved streets and highways in all long- and intermediate-term stationary (see Section 6G.02) TTC zones. All pavement markings shall be in accordance with Chapters 3A and 3B, except as indicated in Section 6F.72. Pavement markings shall match the markings in place at both ends of the TTC zone. Pavement markings shall be placed along the entire length of any surfaced detour or temporary roadway prior to the detour or roadway being opened to road users.**

**Warning signs, channelizing devices, and delineation shall be used to indicate required road user paths in TTC zones where it is not possible to provide a clear path by pavement markings. All pavement markings and devices used to delineate road user paths shall be carefully reviewed during daytime and nighttime periods.**

**For long-term stationary operations, pavement markings in the temporary traveled way that are no longer applicable shall be removed or obliterated as soon as practical. Pavement marking obliteration shall leave a minimum of pavement scars and shall remove old marking material. Painting**

**over existing pavement markings with black paint or spraying with asphalt shall not be accepted as a substitute for removal or obliteration.**

Guidance:

Road users should be provided pavement markings within a TTC zone comparable to the pavement markings normally maintained along such roadways, particularly at either end of the TTC zone.

The intended vehicle path should be defined in day, night, and twilight periods under both wet and dry pavement conditions.

The work should be planned and staged to provide for the placement and removal of the pavement markings.

Markings should be provided in intermediate-term stationary work zones.

Option:

Removable, nonreflective, preformed tape may be used where markings need to be covered temporarily.

Guidance:

Centerlines and lane lines should be placed, replaced, or delineated where appropriate before the roadway is opened to traffic.

### **Section 6F.72 Temporary Pavement Markings**

Support:

Temporary pavement markings are those that are allowed to remain in place until the earliest date when it is practical and possible to install pavement markings that meet the Part 3 standards for pavement markings.

Guidance:

Temporary pavement markings should not be in place for more than 2 weeks unless justified by an engineering study.

**Standard:**

**All temporary pavement markings, including pavement markings for no-passing zones, shall conform to the requirements of Chapters 3A and 3B. All temporary broken-line pavement markings shall use the same cycle length as permanent markings and be at least 0.6 m (2 ft) long.**

Option:

Half-cycle lengths with a minimum of 0.6 m (2 ft) stripes may be used on roadways with severe curvature (see Section 3A.05) for centerlines in passing zones and for lane lines.

For temporary situations of 3 calendar days or less, for a two- or three-lane road, no-passing zones may be identified by using DO NOT PASS (R4-1), PASS WITH CARE (R4-2), and NO PASSING ZONE (W14-3) signs (see Sections 2B.29, 2B.30, and 2C.35) rather than pavement markings. Also, DO NOT PASS, PASS WITH CARE, and NO PASSING ZONE signs may be used instead of pavement markings on roads with low volumes for longer periods in accordance with the State's or highway agency's policy.

Guidance:

If used, the DO NOT PASS, PASS WITH CARE, and NO PASSING ZONE signs should be placed in accordance with Sections 2B.29, 2B.30, and 2C.35.

The temporary use of edge lines, channelizing lines, lane reduction transitions, gore markings, and other longitudinal markings, and the various nonlongitudinal markings (such as stop lines, railroad crossings, crosswalks, words or symbols) should be in accordance with the State's or highway agency's policy.

**Standard:**

**Temporary lane lines and/or centerlines shall consist of retroreflectorized lines approximately 600 mm (24 in) long, 100 mm (4 in) wide, spaced approximately 7.3 m (24 ft) apart.**

Option:

Day/night raised retroreflectorized pavement markers, approved by the Department of Transportation, may be used in lieu of 600 mm (24 in) lines, spaced approximately 7.3 m (24 ft) apart.

Guidance:

Right edge lines should not be simulated with dashed lines or raised pavement markers because they could confuse motorists.

Option:

Portable delineators, permanent type delineators, etc., may be used where it is considered desirable to enhance the edge of traveled way due to curvilinear alignment, narrowing pavement, etc.

Standard:

Locations on two-lane conventional highways where no-passing zone centerline delineation has been obliterated shall be posted with a sign package consisting of a ROAD (STREET) WORK (W20-1) sign and a DO NOT PASS (R4-1) sign.

Guidance:

The R4-1 sign should be posted at 600 m (2000 ft) intervals throughout the extended no-pass zone. A PASS WITH CARE (R4-2) sign should also be placed at the end of the zone.

### Section 6F.73 Raised Pavement Markers

Standard:

~~If raised pavement markers are used to substitute for broken line segments, at least two retroreflective markers shall be placed, one at each end of a segment of 0.6 to 1.5 m (2 to 5 ft) in length. For segments longer than 1.5 m (5 ft), a group of at least three retroreflective markers shall be equally spaced at no greater than N/8 (see Section 3B.11). The value of N for a broken or dotted line shall equal the length of one line segment plus one gap. The value of N referenced for solid lines shall equal the N for the broken or dotted lines that might be adjacent to or might extend the solid lines (see Sections 3B.13 and 3B.14).~~

If raised pavement markers are used to substitute for broken line segments, at least two retroreflective markers shall be placed, one at each end of a segment of 0.9 m (3 ft). For segments over 2.4 m (8 ft), a group of at least three retroreflective markers shall be equally spaced at no greater than 1.2 m (4 ft). See Section 3A.05 for more details.

Guidance:

Raised pavement markers should be considered for use along surfaced detours or temporary roadways, and other changed or new travel-lane alignments.

Option:

Retroreflective or internally illuminated raised pavement markers, or nonretroreflective raised pavement markers supplemented by retroreflective or internally illuminated markers, may replace or supplement markings prescribed in Chapters 3A and 3B.

### Section 6F.74 Delineators

Standard:

When used, delineators shall combine with or supplement other TTC devices. They shall be mounted on crashworthy supports so that the reflecting unit is approximately 1.2 m (4 ft) above the near roadway edge. The standard color for delineators used along both sides of two-way streets and highways and the right side of one-way roadways shall be white. Delineators used along the left side of one-way roadways shall be yellow.

Guidance:

Spacing along roadway curves should be as set forth in Section 3D.04 and should be such that several delineators are always visible to the driver.

Option:

Delineators may be used in TTC zones to indicate the alignment of the roadway and to outline the required vehicle path through the TTC zone.

Standard:

On State highways, the retroreflectorized bands shall be visible at 300 m (1000 ft) at night under illumination of legal high beam headlights, by persons with vision of or corrected to 20/20.

The delineators shall be placed 0.6 m (2 ft) to 1.8 m (6 ft) outside the outer edge of the shoulder. They shall be 75 x 300 mm (3 x 12 in) minimum size.

Guidance:

On local roads, the retroreflectorized bands should be visible at 300 m (1000 ft) at night under illumination of legal high beam headlights, by persons with vision of or corrected to 20/20.

Support:

Refer to Department of Transportation's Standard Specifications Section 12-3.04 for visibility criteria cited. See Section 1A.11 for information regarding this publication.

**Section 6F.75 Lighting Devices**

Guidance:

Lighting devices should be provided in TTC zones based on engineering judgment.

When used to supplement channelization, the maximum spacing for warning lights should be identical to the channelizing device spacing requirements.

Support:

Four types of lighting devices are commonly used in TTC zones. They are floodlights, flashing warning beacons, warning lights, and steady-burn electric lamps.

Option:

Lighting devices may be used to supplement retroreflectorized signs, barriers, and channelizing devices.

During normal daytime maintenance operations, the functions of flashing warning beacons may be provided by high-intensity rotating, flashing, oscillating, or strobe lights on a maintenance vehicle.

**Standard:**

**Although vehicle hazard warning lights are permitted to be used to supplement high-intensity rotating, flashing, oscillating, or strobe lights, they shall not be used instead of high-intensity rotating, flashing, oscillating, or strobe lights.**

**Section 6F.76 Floodlights**

Support:

Utility, maintenance, or construction activities on highways are frequently conducted during nighttime periods when vehicular traffic volumes are lower. Large construction projects are sometimes operated on a double-shift basis requiring night work (see Section 6G.20).

Guidance:

When nighttime work is being performed, floodlights should be used to illuminate the ~~work area~~, equipment crossings, and other areas.

**Standard:**

**When nighttime work is being performed, floodlights shall be used to illuminate the work area.**

**Except in emergency situations, flagger stations shall be illuminated at night.**

**Floodlighting shall not produce a disabling glare condition for approaching road users, flaggers, or workers.**

Guidance:

The adequacy of the floodlight placement and elimination of potential glare should be determined by driving through and observing the floodlighted area from each direction on all approaching roadways after the initial floodlight setup, at night, and periodically.

Support:

Desired illumination levels vary depending upon the nature of the task involved. An average horizontal luminance of ~~50 lux (5 foot candles)~~ 108 lux (10 foot candles) can be adequate for general activities. Tasks requiring high levels of precision and extreme care can require an average horizontal luminance of 216 lux (20 foot candles).

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) for the above modifications. See Section 1A.11 for information regarding this publication.

### **Section 6F.77 Flashing Warning Beacons**

Support:

Flashing warning beacons are often used to supplement a TTC device.

**Standard:**

**Flashing warning beacons shall comply with the provisions of Chapter 4K. A flashing warning beacon shall be a flashing yellow light with a minimum nominal diameter of ~~200 mm (8 in)~~ 300 mm (12 in).**

Guidance:

Flashing warning beacons should be operated 24 hours per day.

Support:

The temporary terminus of a freeway is an example of a location where flashing warning beacons alert drivers to the changing roadway conditions and the need to reduce speed in transitioning from the freeway to another roadway type.

**Standard:**

**The beacon lens shall have a visible diameter of 300 mm (12 in) and shall conform to Department of Transportation's standards for signal lenses, and the lighting unit shall have a visor and back plate or other suitable means of providing adequate contrast.**

**The mounting height shall be between 1.8 m (6 ft) and 3 m (10 ft), measured from the bottom of the base to the center of the lens.**

### **Section 6F.78 Warning Lights**

Support:

Type A, Type B, Type C, and Type D 360-degree warning lights are portable, powered, yellow, lens-directed, enclosed lights.

**Standard:**

**Warning lights shall be in accordance with the current ITE "Purchase Specification for Flashing and Steady-Burn Warning Lights" (see Section 1A.11).**

**When warning lights are used, they shall be mounted on signs or channelizing devices in a manner that, if hit by an errant vehicle, they will not be likely to penetrate the windshield.**

Guidance:

The maximum spacing for warning lights should be identical to the channelizing device spacing requirements.

Support:

The light weight and portability of warning lights are advantages that make these devices useful as supplements to the retroreflectorization on signs and channelizing devices. The flashing lights are effective in attracting road users' attention.

Option:

Warning lights may be used in either a steady-burn or flashing mode.

**Standard:**

**Flashing warning lights shall not be used for delineation, as a series of flashers fails to identify the desired vehicle path.**

**Type A Low-Intensity Flashing warning lights, Type C Steady-Burn warning lights, and Type D 360-degree Steady-Burn warning lights shall be maintained so as to be capable of being visible on a clear night from a distance of 900 m (3,000 ft). Type B High-Intensity Flashing warning lights shall be maintained so as to be capable of being visible on a sunny day when viewed without the sun directly on or behind the device from a distance of 300 m (1,000 ft).**

**Warning lights shall have a minimum mounting height of 750 mm (30 in) to the bottom of the lens.**

Support:

Type A Low-Intensity Flashing warning lights are used to warn road users during nighttime hours that they are approaching or proceeding in a potentially hazardous area.

Option:

Type A warning lights may be mounted on channelizing devices.

**Support:**

Type B High-Intensity Flashing warning lights are used to warn road users during both daylight and nighttime hours that they are approaching a potentially hazardous area.

**Option:**

Type B warning lights are designed to operate 24 hours per day and may be mounted on advance warning signs or on independent supports.

Type C Steady-Burn warning lights and Type D 360-degree Steady-Burn warning lights may be used during nighttime hours to delineate the edge of the traveled way.

**Guidance:**

When used to delineate a curve, Type C and Type D 360-degree warning lights should only be used on devices on the outside of the curve, and not on the inside of the curve.

**Section 6F.79 Steady-Burn Electric Lamps**

**Support:**

Steady-Burn electric lamps are a series of low-wattage, yellow, electric lamps, generally hard-wired to a 110-volt external power source.

**Option:**

Steady-Burn electric lamps may be used in place of Type C Steady-Burn warning lights (see Section 6F.78).

**Section 6F.80 Temporary Traffic Control Signals**

**Standard:**

**Temporary traffic control signals (see Section 4D.20) used to control road user movements through TTC zones and in other TTC situations shall meet the applicable provisions of Part 4 and for State highways, the Department of Transportation's Standard Plans and/or Special Provisions. See Section 1A.11 for information regarding this publication.**

**Support:**

Temporary traffic control signals are typically used in TTC zones such as temporary haul road crossings; temporary one-way operations along a one-lane, two-way highway; temporary one-way operations on bridges, reversible lanes, and intersections.

**Standard:**

**One-lane, two-way vehicular traffic flow (see Chapter 4G) requires an all-red interval of sufficient duration for road users to clear the portion of the TTC zone controlled by the traffic control signals. Safeguards shall be incorporated to avoid the possibility of conflicting signal indications at each end of the TTC zone.**

**Guidance:**

Where pedestrian traffic is detoured to a temporary traffic control signal, engineering judgment should be used to determine if pedestrian signals or accessible pedestrian signals (see Section 4E.06) are needed for crossing along an alternate route.

When temporary traffic control signals are used, conflict monitors typical of traditional traffic control signal operations should be used.

**Option:**

Temporary traffic control signals may be portable or temporarily mounted on fixed supports.

**Standard:**

**The supports for temporary traffic control signals shall not encroach into the minimum required width of a "pedestrian access route" of 1200 mm (48 in) or an "alternate circulation path" of 900 mm (36 in).**

**Guidance:**

Temporary traffic control signals should only be used in situations where temporary traffic control signals are preferable to other means of traffic control, such as changing the work staging or work zone size to eliminate one-way vehicular traffic movements, using flaggers to control one-way or crossing movements, using STOP or YIELD signs, and using warning devices alone.

**Support:**

Factors related to the design and application of temporary traffic control signals include the following:

- A. Safety and road user needs;
- B. Work staging and operations;
- C. The feasibility of using other TTC strategies (for example, flaggers, providing space for two lanes, or detouring road users, including bicyclists and pedestrians);
- D. Sight distance restrictions;
- E. Human factors considerations (for example, lack of driver familiarity with temporary traffic control signals);
- F. Road-user volumes including roadway and intersection capacity;
- G. Affected side streets and driveways;
- H. Vehicle speeds;
- I. The placement of other TTC devices;
- J. Parking;
- K. Turning restrictions;
- L. Pedestrians;
- M. The nature of adjacent land uses (such as residential or commercial);
- N. Legal authority;
- O. Signal phasing and timing requirements;
- P. Full-time or part-time operation;
- Q. Actuated, fixed-time, or manual operation;
- R. Power failures or other emergencies;
- S. Inspection and maintenance needs;
- T. Need for detailed placement, timing, and operation records; and
- U. Operation by contractors or by others.

Although temporary traffic control signals can be mounted on trailers or lightweight portable supports, fixed supports offer superior resistance to displacement or damage by severe weather, vehicle impact, and vandalism.

**Guidance:**

Other TTC devices should be used to supplement temporary traffic control signals, including warning and regulatory signs, pavement markings, and channelizing devices.

The design and placement of temporary traffic control signals should include interconnection to other traffic control signals along the subject roadway.

Temporary traffic control signals not in use should be covered or removed.

**Section 6F.81 Temporary Traffic Barriers**

**Support:**

Temporary traffic barriers are devices designed to help prevent penetration by vehicles while minimizing injuries to vehicle occupants, and are designed to protect workers, bicyclists, and pedestrians.

The four primary functions of temporary traffic barriers are:

- A. To keep vehicular traffic from entering work areas, such as excavations or material storage sites;
- B. To separate workers, bicyclists, and pedestrians from motor vehicle traffic;
- C. To separate opposing directions of vehicular traffic; and
- D. To separate vehicular traffic, bicyclists, and pedestrians from the work area such as false work for bridges and other exposed objects.

**Option:**

Temporary traffic barriers, including shifting portable or movable barrier installations to accommodate varying directional vehicular traffic demands, may be used to separate two-way vehicular traffic.

**Guidance:**

Because the protective requirements of a TTC situation have priority in determining the need for temporary traffic barriers, their use should be based on an engineering study. When serving the additional

function of channelizing vehicular traffic (see Section 6F.65), temporary traffic barriers should be a light color for increased visibility.

**Standard:**

**Temporary traffic barriers shall be supplemented with standard delineation, pavement markings, or channelizing devices for improved daytime and nighttime visibility if they are used to channelize vehicular traffic. The delineation color shall match the applicable pavement marking color.**

**In order to mitigate the effect of striking the end of a temporary traffic barrier, the end shall be installed in accordance with AASHTO's "Roadside Design Guide" (see Section 1A.11) by flaring until the end is outside the acceptable clear zone or by providing crashworthy end treatments.**

**Option:**

Warning lights or steady-burn electric lamps may be mounted on temporary traffic barrier installations.

Side reflectors with cube-corner lenses or top mounted reflectors (facing the driver) may be used on temporary traffic barriers.

**Guidance:**

If used, the spacing of these reflectors should not exceed a distance in meters (feet) equal to 0.2 times the speed limit in km/h (1.0 times the speed limit in mph) through the TTC zone.

**Support:**

A movable barrier is a linear system of connected barrier segments that can rapidly be shifted laterally by using a specially designed transfer vehicle. The transfer is accomplished in a manner that does not interfere with vehicular traffic in adjacent lanes. Applications of movable barriers include the following:

- A. Closing an additional lane during work periods while maintaining the advantage of having the travel way separated from the work space by a barrier;
- B. Closing an additional lane during off-peak periods to provide extra space for work activities without adversely impacting vehicular traffic flow; and
- C. Creating a temporary reversible lane, thus providing unbalanced capacity favoring the major direction of vehicular traffic flow.

More specific information on the use of temporary traffic barriers is contained in Chapters 8 and 9 of AASHTO's "Roadside Design Guide" (see Section 1A.11).

**Support:**

More specific information on the use of portable barriers and crash cushions can be obtained from the Department of Transportation's Standard Plans and Standard Specifications. See Section 1A.11 for information regarding this publication.

### **Section 6F.82 Crash Cushions**

**Support:**

Crash cushions are systems that mitigate the effects of errant vehicles that strike obstacles, either by smoothly decelerating the vehicle to a stop when hit head-on, or by redirecting the errant vehicle. The two types of crash cushions that are used in TTC zones are stationary crash cushions and truck-mounted attenuators. Crash cushions in TTC zones help protect the drivers from the exposed ends of barriers, fixed objects, shadow vehicles, and other obstacles. Specific information on the use of crash cushions can be found in AASHTO's "Roadside Design Guide" (see Section 1A.11).

**Standard:**

**Crash cushions shall be crashworthy. They shall also be designed for each application to stop or redirect errant vehicles under prescribed conditions. Crash cushions shall be periodically inspected to verify that they have not been hit or damaged. Damaged crash cushions shall be promptly repaired or replaced to maintain their crashworthiness.**

**Support:**

Stationary crash cushions are used in the same manner as permanent highway installations to protect drivers from the exposed ends of barriers, fixed objects, and other obstacles.

**Standard:**

**Stationary crash cushions shall be designed for the specific application intended.**

**Truck-mounted attenuators shall be energy-absorbing devices attached to the rear of shadow trailers or trucks. If used, the shadow vehicle with the attenuator shall be located in advance of the work area, workers, or equipment to reduce the severity of rear-end crashes from errant vehicles.**

Support:

Trucks or trailers are often used as shadow vehicles to protect workers or work equipment from errant vehicles. These shadow vehicles are normally equipped with flashing arrows, changeable message signs, and/or high-intensity rotating, flashing, oscillating, or strobe lights located properly in advance of the workers and/or equipment that they are protecting. However, these shadow vehicles might themselves cause injuries to occupants of the errant vehicles if they are not equipped with truck-mounted attenuators.

Guidance:

The shadow truck should be positioned a sufficient distance in advance of the workers or equipment being protected so that there will be sufficient distance, but not so much so that errant vehicles will travel around the shadow truck and strike the protected workers and/or equipment.

Support:

Chapter 9 of AASHTO's "Roadside Design Guide" (see Section 1A.11) contains additional information regarding the use of shadow vehicles.

Guidance:

If used, the truck-mounted attenuator should be used in accordance with the manufacturer's specifications.

Support:

Information about designs and types of crash cushions currently approved for use on State highways is available from Department of Transportation's Division of Traffic Operations in Sacramento. A list of approved products is available on the Internet at the following web address:

[http://www.dot.ca.gov/hq/esc/approved\\_products\\_list/HighwaySafe.htm](http://www.dot.ca.gov/hq/esc/approved_products_list/HighwaySafe.htm)

### **Section 6F.83 Vehicle-Arresting Systems**

Support:

Vehicle-arresting systems are designed to prevent penetration into activity areas while providing for smooth, reasonably safe deceleration for the errant vehicles. They can consist of portable netting, cables, and energy absorbing anchors.

Guidance:

When used, a vehicle-arresting system should be used in accordance with the manufacturer's specifications, and should be located so that vehicles are not likely to penetrate the location that the system is designed to protect.

### **Section 6F.84 Rumble Strips**

Support:

Transverse rumble strips consist of intermittent narrow, transverse areas of rough-textured or slightly raised or depressed road surface that extend across the travel lanes to alert drivers to unusual vehicular traffic conditions. Through noise and vibration they attract the driver's attention to such features as unexpected changes in alignment and to conditions requiring a stop.

Longitudinal rumble strips consist of a series of rough-textured or slightly raised or depressed road surfaces located along the shoulder to alert road users that they are leaving the travel lanes.

**Standard:**

**If it is desirable to use a color other than the color of the pavement for a longitudinal rumble strip, the color of the rumble strip shall be the same color as the longitudinal line the rumble strip supplements.**

**If the color of a transverse rumble strip used within a travel lane is not the color of the pavement, the color of the rumble strip shall be white.**

Option:

Intervals between transverse rumble strips may be reduced as the distance to the approached conditions is diminished in order to convey an impression that a closure speed is too fast and/or that an action is

imminent. A sign warning drivers of the onset of rumble strips may be placed in advance of any transverse rumble strip installation.

**Guidance:**

Transverse rumble strips should be placed transverse to vehicular traffic movement. They should not adversely affect overall pavement skid resistance under wet or dry conditions.

In urban areas, even though a closer spacing might be warranted, transverse rumble strips should be designed in a manner that does not promote unnecessary braking or erratic steering maneuvers by road users.

Transverse rumble strips should not be placed on sharp horizontal or vertical curves.

Rumble strips should not be placed through pedestrian crossings or on bicycle routes.

Transverse rumble strips should not be placed on roadways used by bicyclists unless a minimum clear path of 1.2 m (4 ft) is provided at each edge of the roadway or on each paved shoulder as described in AASHTO's "Guide to the Development of Bicycle Facilities" (see Section 1A.11).

Longitudinal rumble strips should not be placed on the shoulder of a roadway that is used by bicyclists unless a minimum clear path of 1.2 m (4 ft) is also provided on the shoulder.

**Support:**

Rumble strips are not suitable as a riding surface for bicycles and motorcycles.

Refer to Section 3B.106(CA) for more details on rumble strips.

**Guidance:**

Where cyclists are permitted, provisions should be made to allow passage through or around the rumble strips.

### **Section 6F.85 Screens**

**Support:**

Screens are used to block the road users' view of activities that can be distracting. Screens might improve safety and motor vehicle traffic flow where volumes approach the roadway capacity because they discourage gawking and reduce headlight glare from oncoming motor vehicle traffic.

**Guidance:**

Screens should not be mounted where they could adversely restrict road user visibility and sight distance and adversely affect the reasonably safe operation of vehicles.

**Option:**

Screens may be mounted on the top of temporary traffic barriers that separate two-way motor vehicle traffic.

Temporary traffic screen may be mounted on top of temporary traffic barriers, when barriers are used in transition and crossover areas for glare-control on high-volume roadways.

**Guidance:**

If used, temporary traffic screen panels should be contiguous without gaps, minimum 813 mm (32 in) in height, and orange or red-orange in color.

**Guidance:**

Design of screens should be in accordance with Chapter 9 of AASHTO's "Roadside Design Guide" (see Section 1A.11).

### **Section 6F.86 Future and Experimental Devices**

**Support:**

The States, FHWA, AASHTO, the Transportation Research Board, and other organizations conduct research and experimentation on new traffic control and safety devices. Users of this Manual are encouraged to stay abreast of these current efforts and to use such devices with care so as to avoid presenting road users with unusual or confusing situations that might be abnormal or unexpected.

**Standard:**

**New traffic control devices shall conform to the provisions for design, use, and application set forth in this Manual. New traffic control devices that do not conform with the provisions in this Manual shall be subject to experimentation, documentation, and adoption following the provisions of Section 1A.10.**

**Section 6F.101(CA) Channelizers (Permanent type, flexible post)**

**Support:**

Channelizers are implanted in the ground or affixed to the pavement, and are not susceptible to displacement, and are capable of normally withstanding numerous vehicular impacts.

Channelizers are generally used in series to create a visual fence/barrier, to provide additional guidance and/or restriction to traffic.

**Option:**

They also may be used in lieu of cones, portable delineators, or drums, to channelize traffic, divide opposing lanes of traffic, etc.

**Standard:**

The design of a channelizer shall be as shown in Figure 6F-102(CA).

The height shall be 900 mm (36 in) minimum (700 mm (28 in) where speeds are 65 km/h (40 mph) or less), the width of the post shall be 56 mm (2 ¼ in) minimum and the color predominantly orange. The 75 x 300 mm (3 x 12 in) minimum retroreflective unit shall be visible at 300 m (1000 ft) at night under illumination of legal high beam headlights, by persons with vision of or corrected to 20/20.

The color of the channelizer retroreflective unit shall be white and posts shall be orange.

**Support:**

Refer to Department of Transportation's Standard Specifications Section 12-3.07 for visibility criteria cited. See Section 1A.11 for information regarding this publication.

Refer Chapter 3F for other details and requirements of channelizers.

**Section 6F.102(CA) LOOSE GRAVEL Sign (W8-7)**

**Guidance:**

The LOOSE GRAVEL (W8-7) sign should be used on chip seal jobs or other areas to warn motorists that there is loose gravel on the roadway.

**Standard:**

When used, the W8-7 sign shall be placed at the beginning of work and at maximum 610 m (2000 ft) intervals.

**Option:**

The Advisory Speed (W13-1) plaque may be used in combination with the W8-7 sign to indicate the need to decrease speed at a particular location.

**Guidance:**

The advisory speed should be reasonable or prudent, considering weather, visibility, traffic, surface condition and width of the roadway.

**Standard:**

On State highways for seal coat projects, the W13-1 (35) plaque shall supplement the W8-7 sign during placing and/or brooming of screenings.

**Section 6F.103(CA) NARROW LANE(S) Sign (C12(CA))**

**Option:**

The NARROW LANE(S) (C12(CA)) sign may be used, when appropriate, to warn the approaching motorist of a narrow lane condition.

**Guidance:**

When used, the C12(CA) sign should be used in conjunction with an Advisory Speed (W13-1) plaque. See Section 2C.46.

**Section 6F.104(CA) Road Work/Speed Limit Sign (C17(CA))**

**Standard:**

The Road Work/Speed Limit (C17(CA)) sign shall not be used on State highways.

The C17(CA) sign shall only be used in conjunction with appropriate advance warning signs.

The C17(CA) signs shall be removed promptly when no longer applicable.

**Support:**

The C17(CA) sign is authorized for use by CVC Section 22362. This section provides authority to post a speed limit of not less than 40 km/h (25 mph) at locations where employees of any contractor, or of the agency in charge of the job, are engaged in work upon the roadway.

Posting unrealistically low speed limits will result in loss of sign credibility and a high violation rate.

**Guidance:**

Before using a C17(CA) sign, work zone conditions should be analyzed to determine what maximum speed limit would be appropriate for that particular location.

The C17(CA) sign should be placed within 120 m (400 ft) of the zone where workers are on the roadway or so nearly adjacent as to be endangered by traffic.

**Option:**

The C17(CA) sign may be provided by the agency having jurisdiction over the street or road.

**Section 6F.105(CA) OPEN TRENCH Sign (C27(CA))**

**Standard:**

The OPEN TRENCH (C27(CA)) sign shall be used in advance of open trenches in/or adjacent to roadway.

The edge of the traveled way shall be defined by edge line delineation consisting of appropriate markers or striping. Edge line delineation shall be white when located on the right of traffic and yellow when located on the left of traffic.

**Support:**

The 900 x 900 mm (36 x 36 in) size is for conventional state highways and the 1200 x 1200 mm (48 x 48 in) size is for use on freeways and expressways.

**Guidance:**

Trenches in excess of 46 mm (0.15 ft) in depth but not exceeding 76 mm (0.25 ft) in depth that are less than 2.4 m (8 ft) from the edge of traveled way should be identified by LOW SHOULDER (W8-9) portable signs on Type II barricades set in the trench adjacent to the edge of pavement at intervals not to exceed 610 m (2,000 ft).

**Option:**

Portable delineators may be placed at intervals not to exceed 30 m (100 ft) in lieu of edge line delineation.

**Standard:**

Trenches in excess of 76 mm (0.25 ft) in depth that are less than 2.4 m (8 ft) from the edge of traveled way shall be identified by C27(CA) and NO SHOULDER (C31A(CA)) portable signs on Type II or Type III barricades alternately set in the trench at intervals not to exceed 610 m (2,000 ft).

**Guidance:**

Channelizers or delineators should be placed 0.6 m (2 ft) to 1.8 m (6 ft) outside of the edge line at 30 m (100 ft) intervals.

Trenches in excess of 76 mm (0.25 ft) in depth but not exceeding 762 mm (2.5 ft) in depth that are 2.4 m (8 ft) to 4.6 m (15 ft) from the edge of traveled way should be identified by C27(CA) portable signs on Type II or Type III barricades set in the trench at intervals not to exceed 610 m (2,000 ft). Delineators should be placed at 60 m (200 ft) intervals within 0.6 m (2 ft) from the edge of the trench and at 30 m (100 ft) intervals for edge conditions exceeding 152 mm (0.5 ft) in depth.

Trenches in excess of 152 mm (0.5 ft) in depth but not exceeding 762 mm (2.5 ft) in depth that are more than 4.6 m (15 ft) from the edge of traveled way at locations where a recovery area was available prior to construction should be identified by placing delineators at 60 m (200 ft) intervals within 0.6 m (2 ft) from the edge of the trench and by placing C27(CA) signs in the trench at intervals not to exceed 610 m (2,000 ft).

**Standard:**

Signing for trenches in excess of 762 mm (2.5 ft) in depth shall be based upon engineering judgment or studies (as noted in Section 1A.09) to ensure proper visibility of barricades and signing.

**Section 6F.106(CA) Traffic Fines Signs (C40(CA) and C40A(CA))**

**Option:**

The TRAFFIC FINES DOUBLED IN CONSTRUCTION ZONES (C40(CA)) and TRAFFIC FINES DOUBLED IN WORK ZONES (C40A(CA)) signs may be placed approximately 150 m (500 ft) in advance of the first required TTC sign(s). The placement of the C40(CA) and C40A(CA) signs is at the discretion of the responsible person(s) in charge of the work zone.

**Guidance:**

The C40A(CA) sign is intended to be manufactured as a fabric sign and should be used on a short term (daily) basis only. Longer term situations should use the C40(CA) sign.

**Section 6F.107(CA) Moving Lane Closure Signs (W23-1 and SC10(CA), SC11(CA), SC13(CA), SC15(CA))**

**Standard:**

On State highways, the following signs shall be used as shown in the Department of Transportation's Standard Plans T15, T16 and T17 for moving lane closures. See Section 1A.11 for information regarding this publication.

LANE CLOSED AHEAD or ROAD WORK AHEAD (SC10(CA)).

LANE CLOSED (SC11(CA)).

SLOW TRAFFIC AHEAD (W23-1).

DO NOT PASS (SC13(CA)).

CAUTION (SC15(CA)).

The Moving Lane Closure signs shall have a black legend on either a white or an orange background.

If used, the SC10(CA) sign and a Type II flashing arrow sign shall be mounted on the rear of the designated sign vehicle.

The SC11(CA) sign and a Type II flashing arrow sign shall be mounted on the rear of the designated sign vehicle.

If used, the W23-1 sign shall be mounted on the rear of the designated sign vehicle.

The SC13(CA) sign shall be mounted on the rear and/or the front of the designated sign vehicle.

If used, the SC15(CA) sign shall be mounted on the front of the designated sign vehicle.

**Section 6F.108(CA) Object Markers**

**Standard:**

When used in work zones, the Type N-3(CA) or OM1-3 object markers shall have an orange retroreflective background.

When used in work zones, the Type P(CA), R(CA), OM-3L, OM-3R and OM-3C object marker shall have alternating retroreflective orange and white stripes.

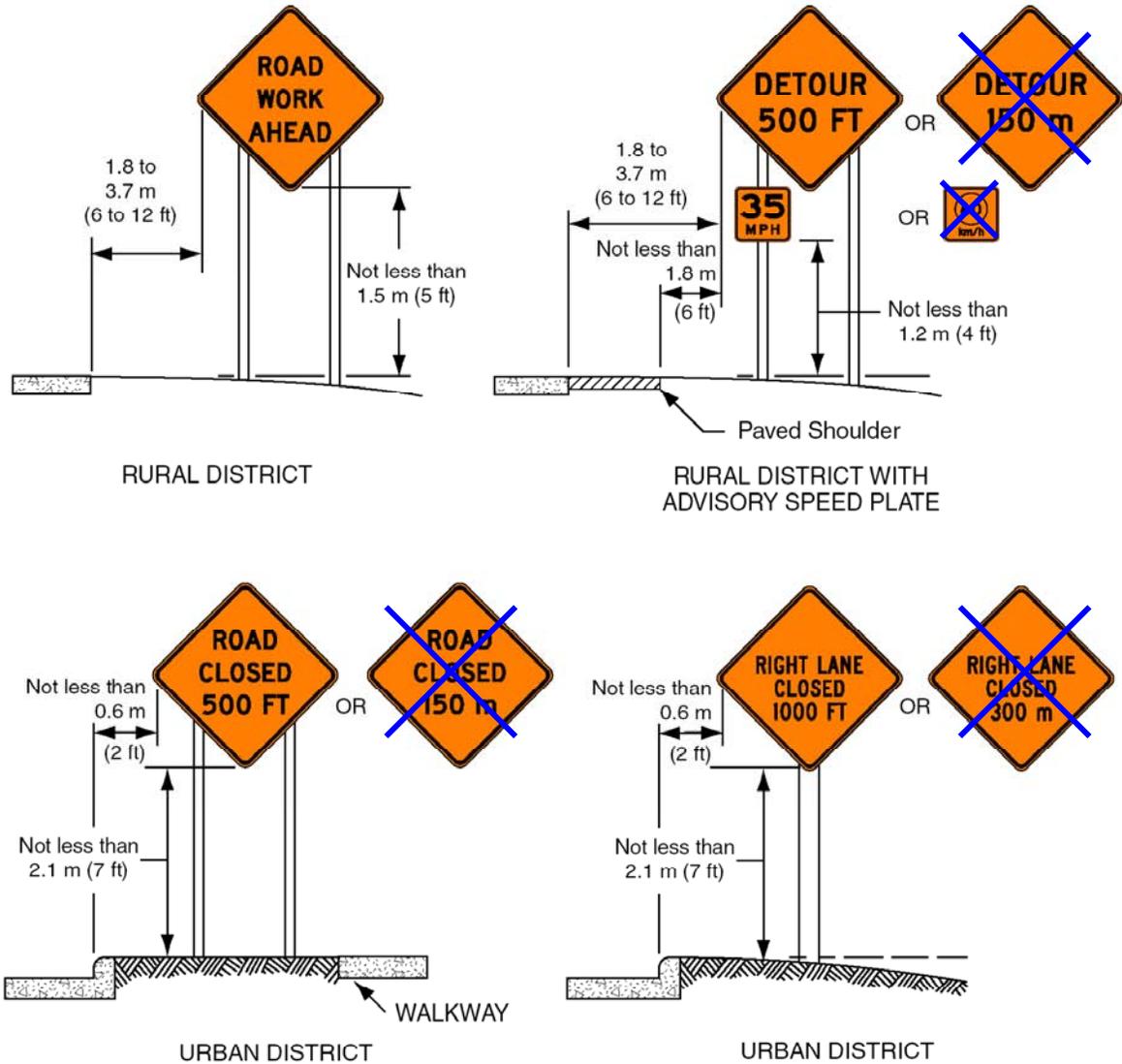
**Support:**

Figure 6F-103(CA) shows examples of object markers in TTC zones.

See Chapter 3C for more details.

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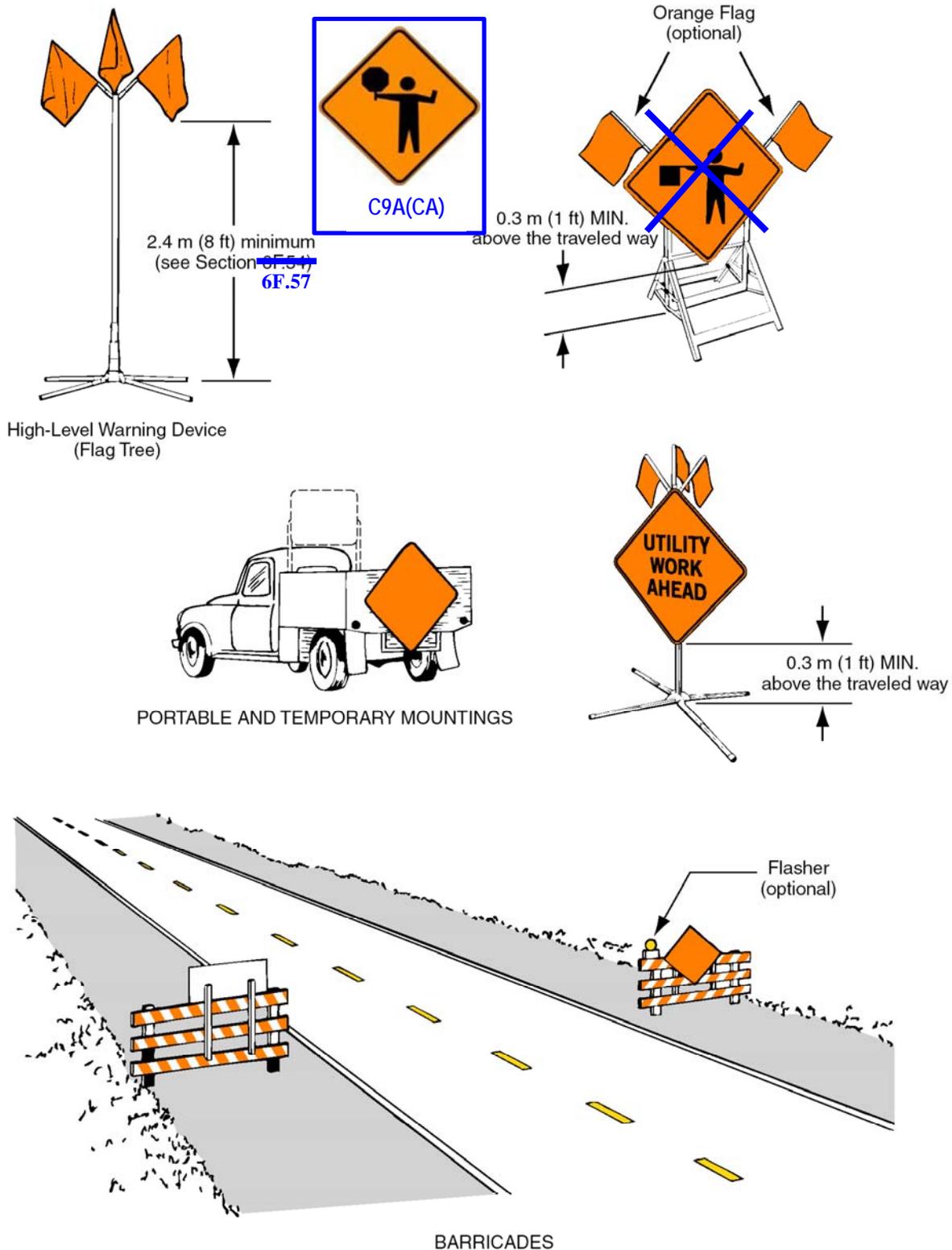
**Figure 6F-1. Height and Lateral Location of Signs—Typical Installations**



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

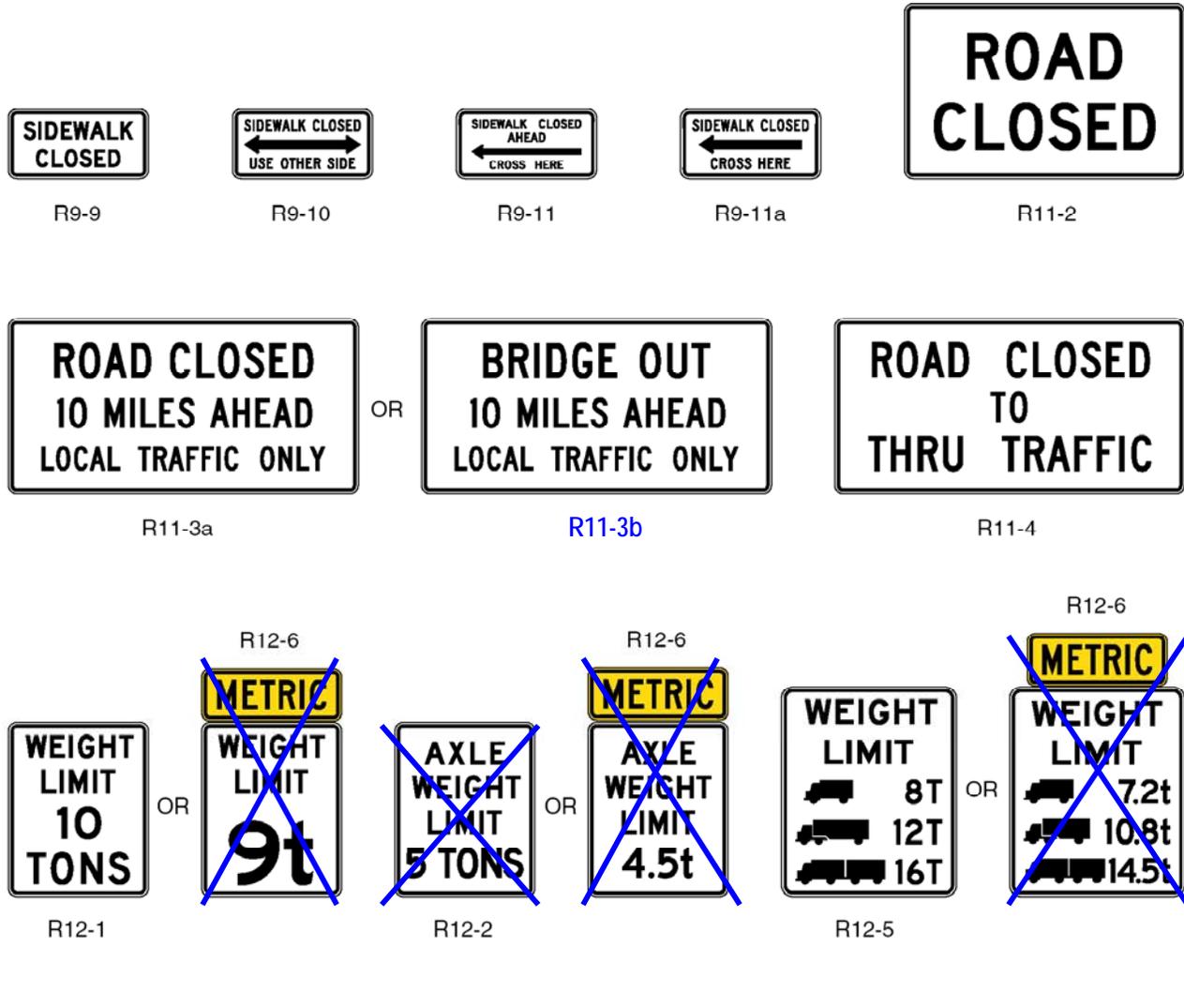
Use CA Flagger symbol  
sign shown below



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

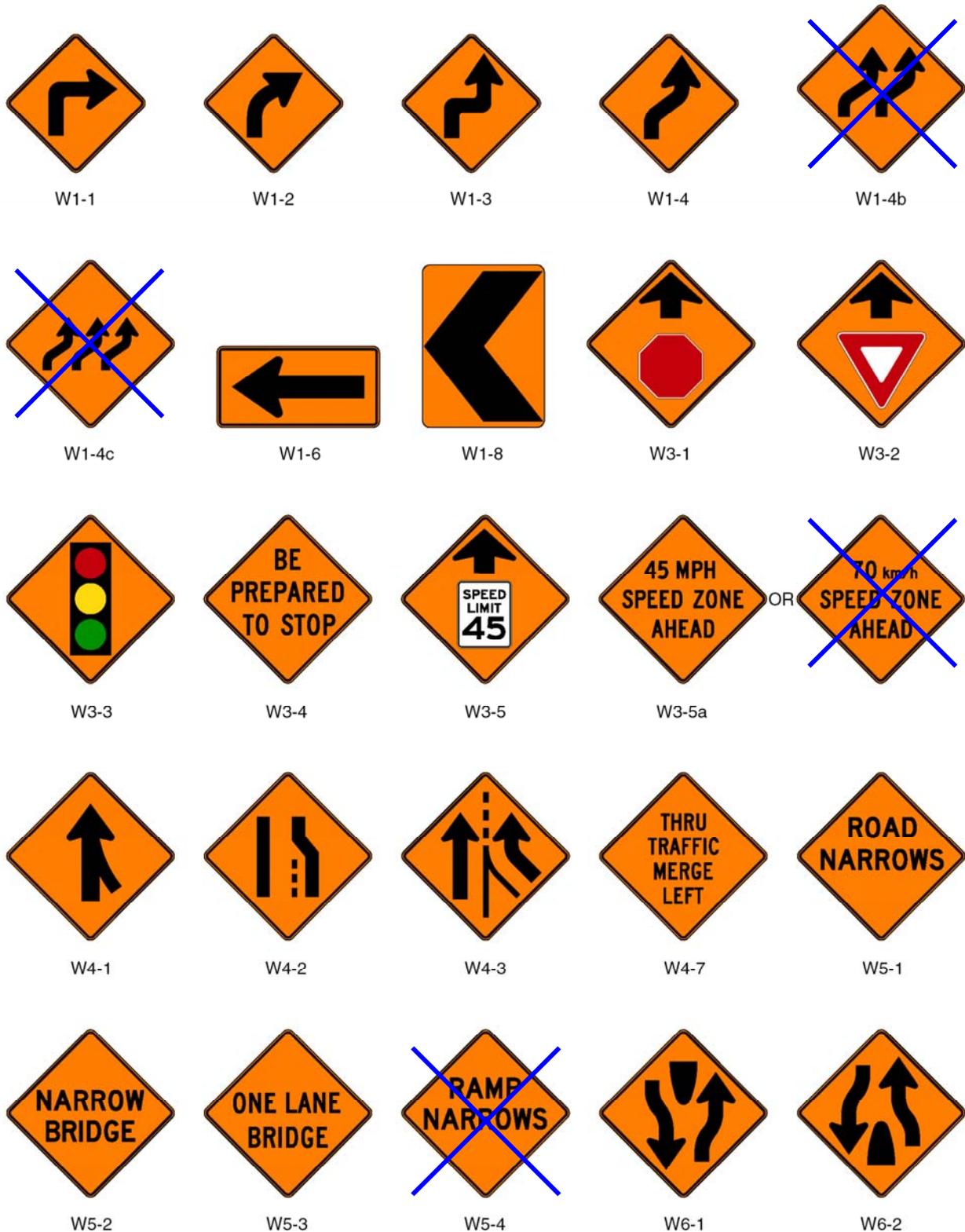


**Figure 6F-3. Regulatory Signs in Temporary Traffic Control Zones**  
(Sheet 2 of 2)

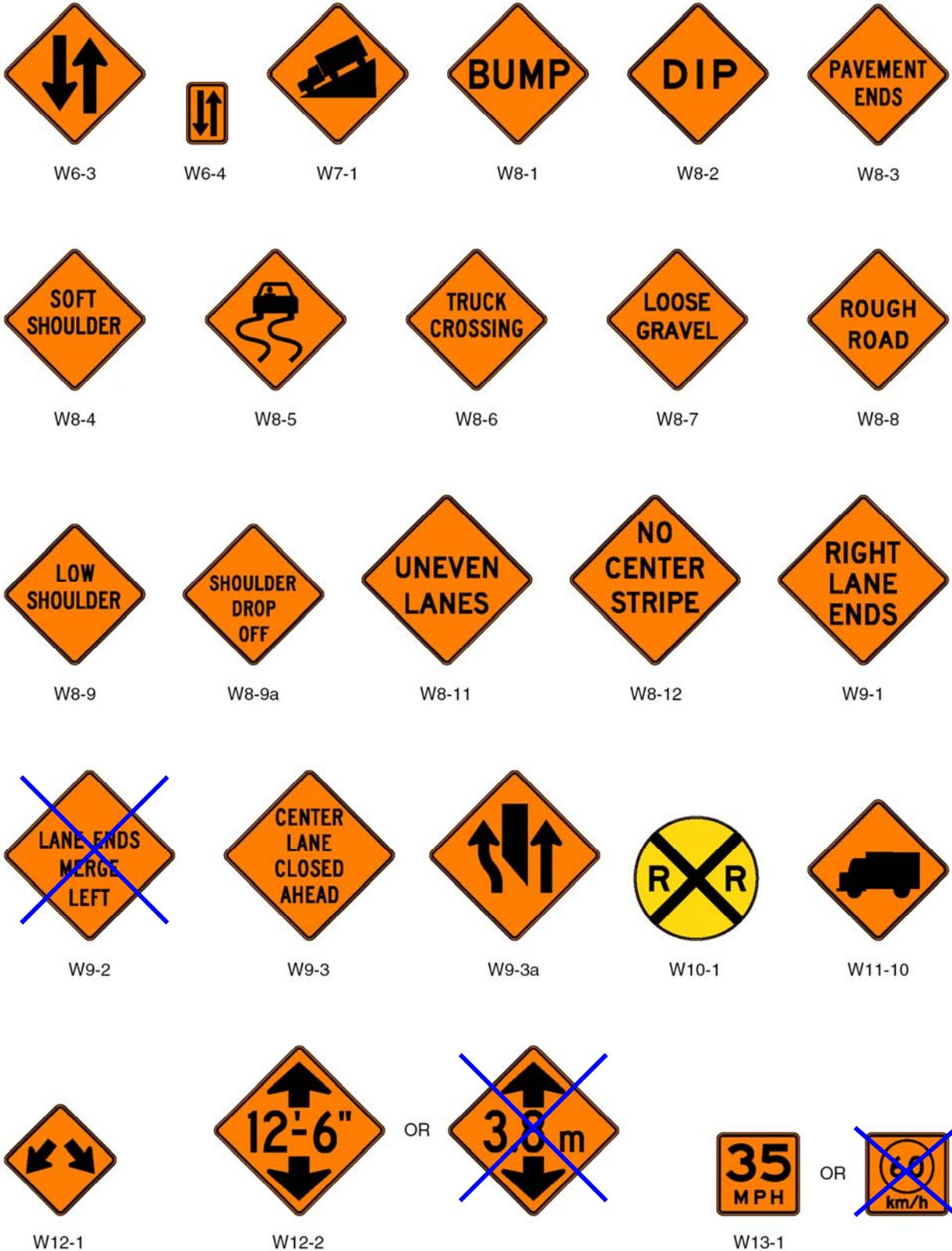


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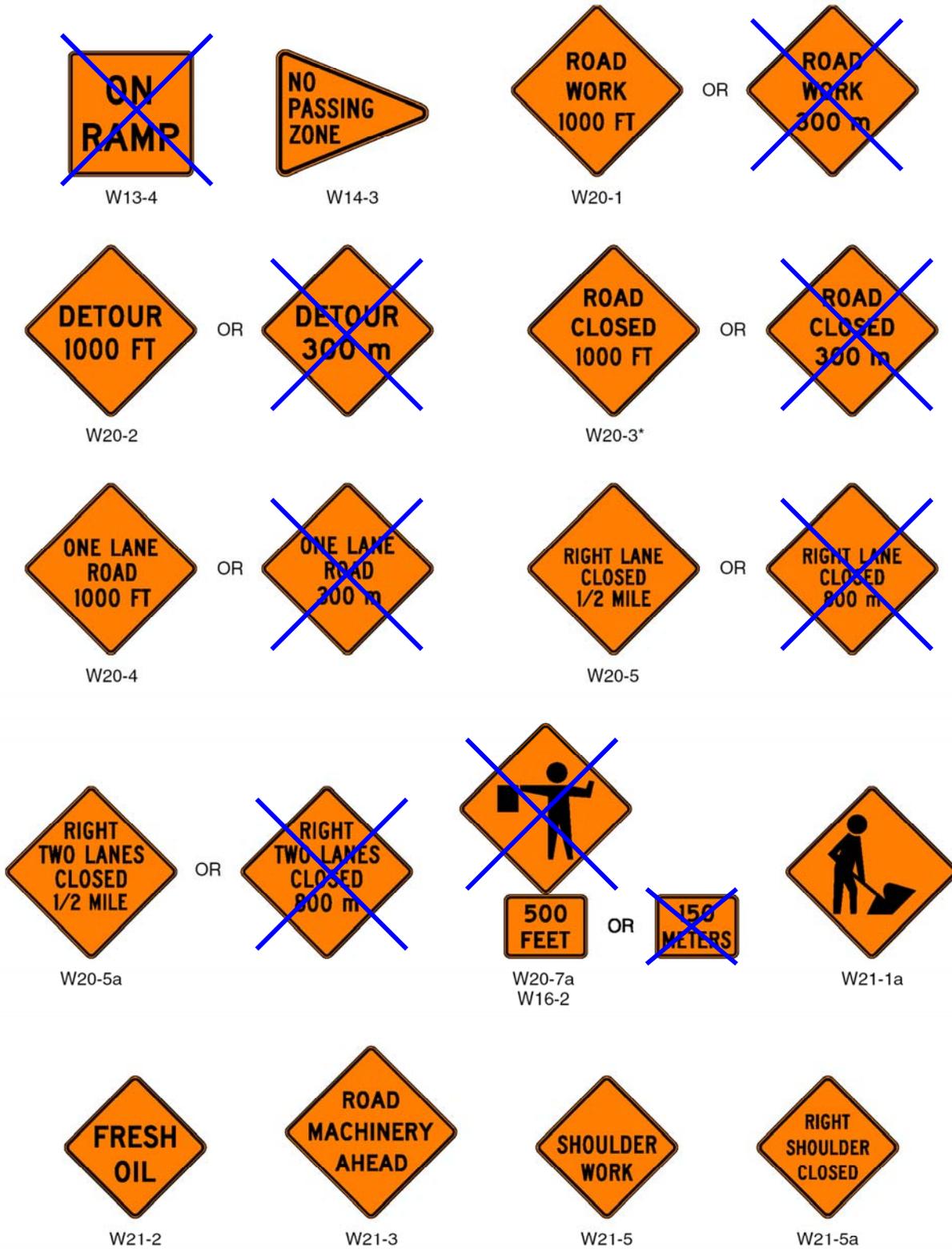
**Figure 6F-4. Warning Signs in Temporary Traffic Control Zones**  
 (Sheet 1 of 4)



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

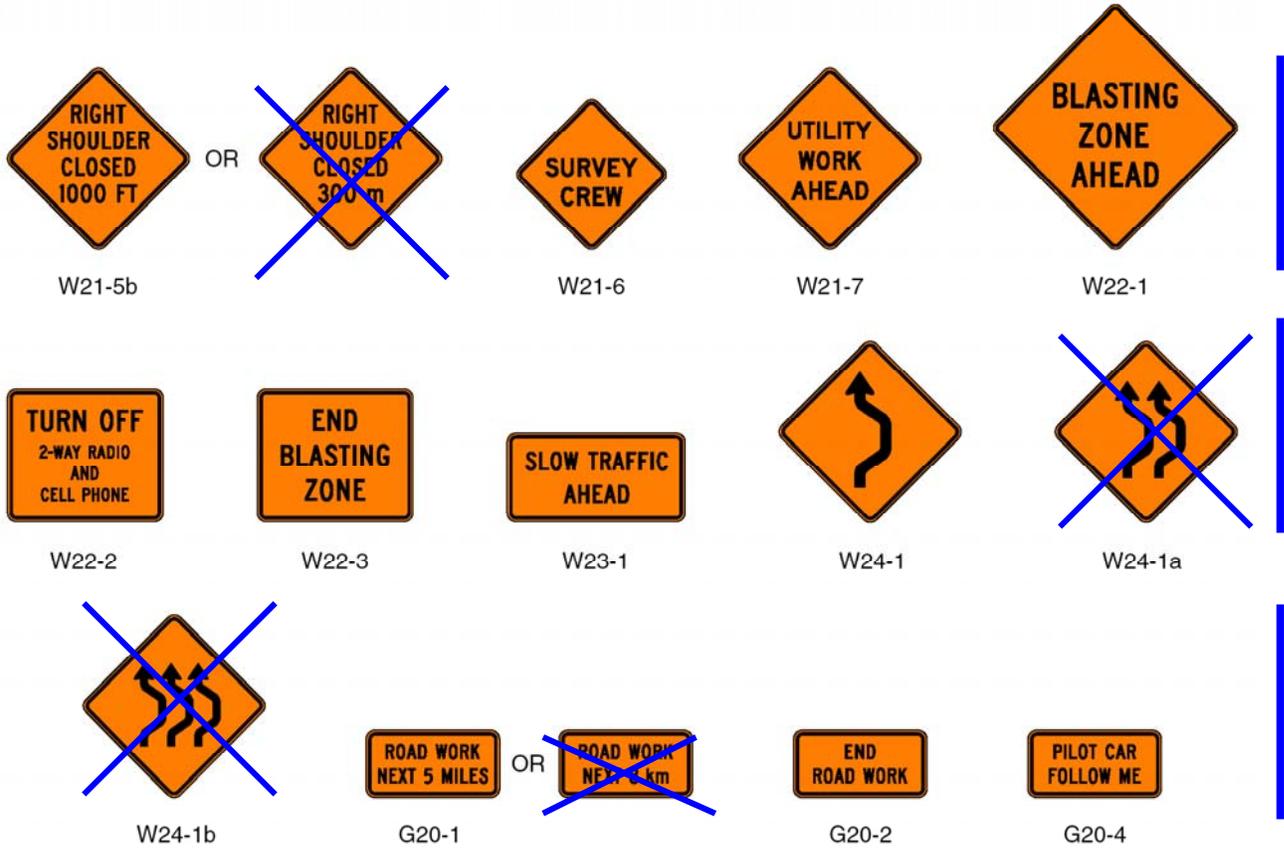


**Figure 6F-4. Warning Signs in Temporary Traffic Control Zones**  
 (Sheet 3 of 4)

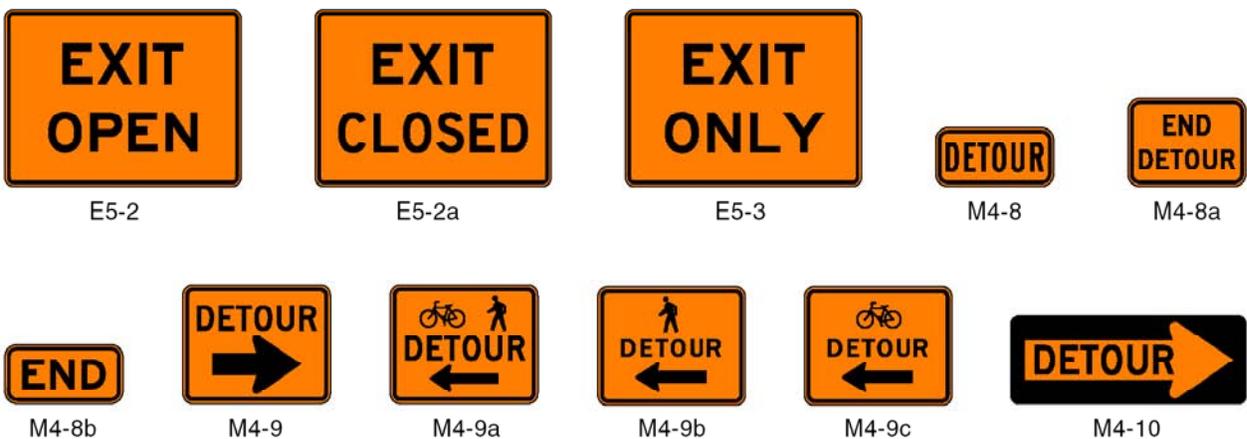


\* An optional STREET CLOSED word message sign is shown in the "Standard Highway Signs" book.

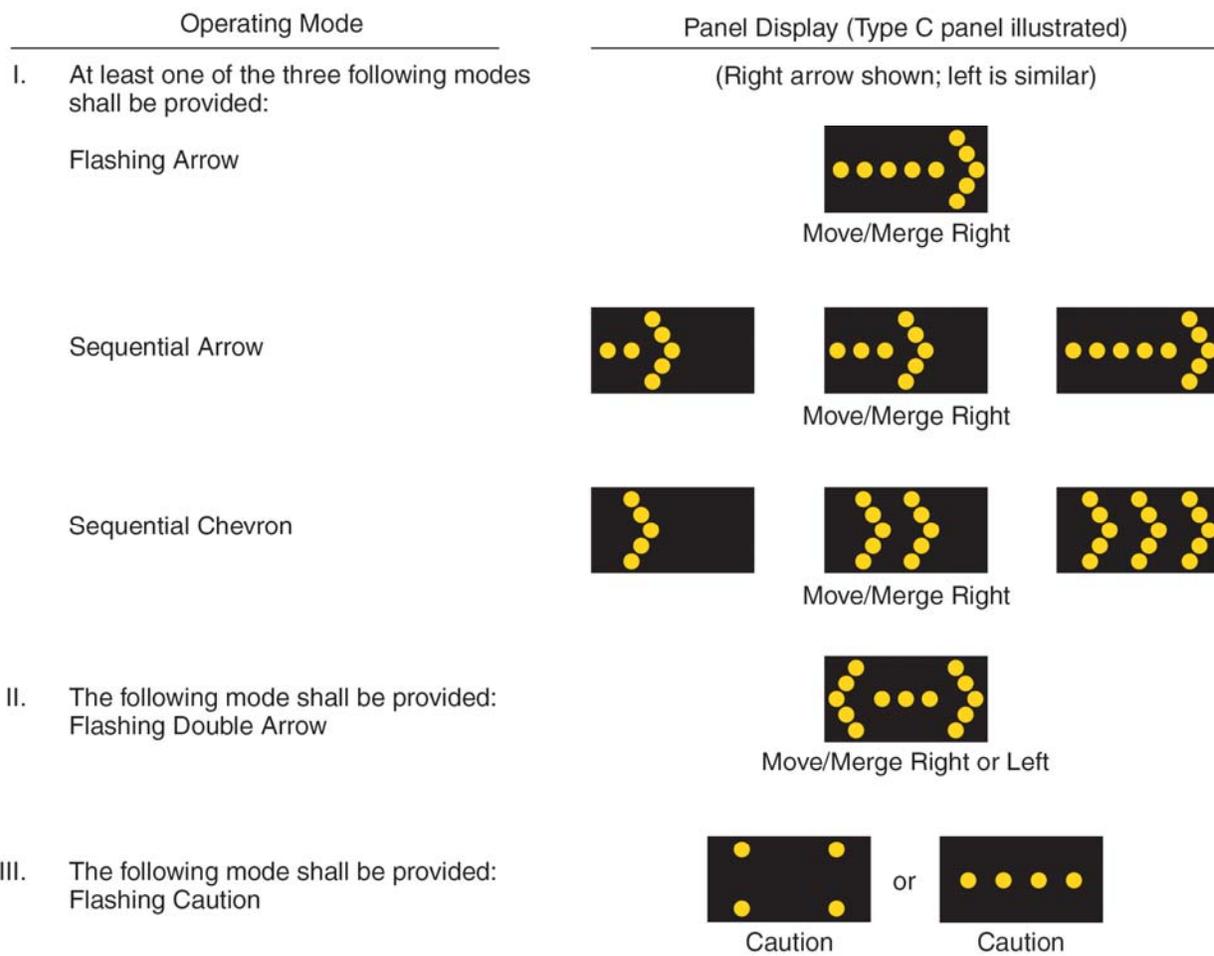
**Figure 6F-4. Warning Signs in Temporary Traffic Control Zones**  
 (Sheet 4 of 4)



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



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



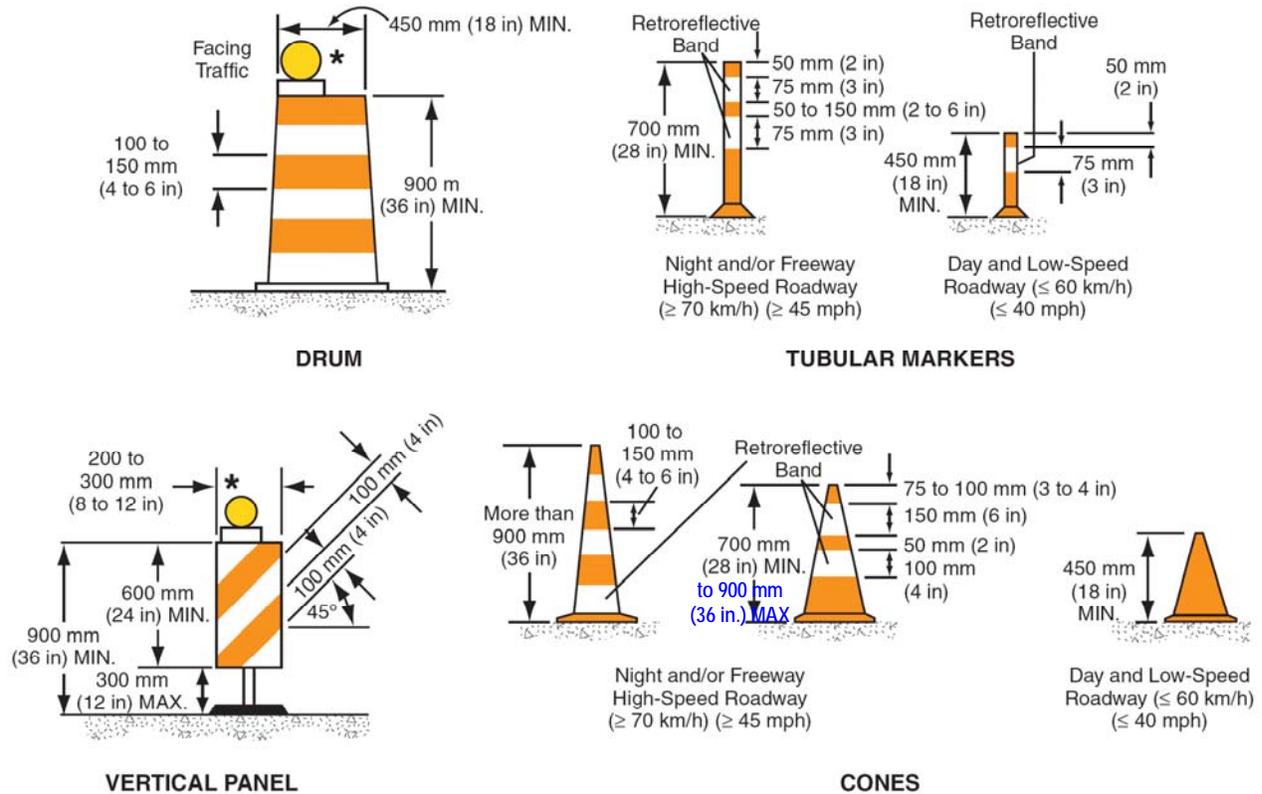
Panel Type	Minimum Size	Minimum Legibility Distance	Minimum Number of Elements
A	1200 x 600 mm (48 x 24 in)	0.8 km (1/2 mi)	12
B or II**	<del>1500 x 750 mm (60 x 30 in)</del> 1800 x 900 mm (72 x 36 in)	1.2 km (3/4 mi)	13
C or I**	2400 x 1200 mm (96 x 48 in)	1.6 km (1 mi)	15
D	None*	0.8 km (1/2 mi)	12

\*Length of arrow equals 1200 mm (48 in), width of arrowhead equals 600 mm (24 in)

**Standard:**

- \* - For State highways, the panel type B shall mean type II and the panel type C shall mean type I.
- \* - For State highways, the panel type B (or type II) shall have a minimum size of 1800 x 900 mm (72 x 36 in).

**Figure 6F-7. Channelizing Devices (Sheet 1 of 2)**

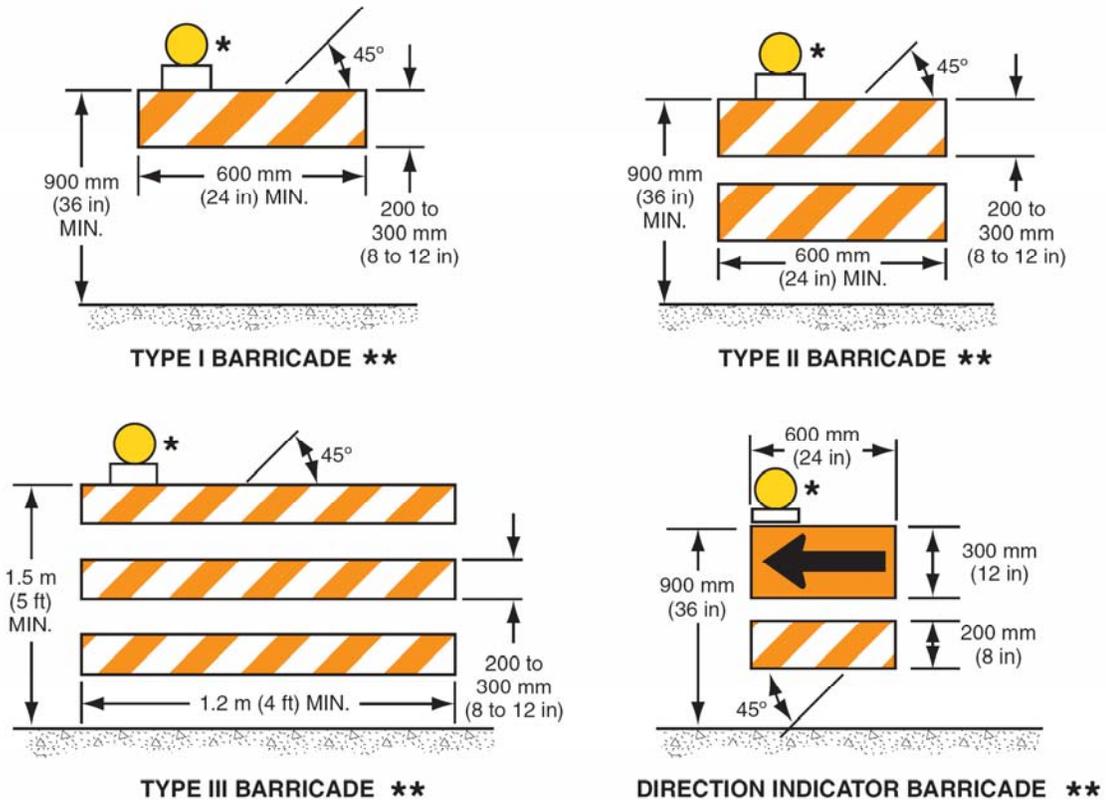


\* Warning lights (optional)

Note: If drums, cones, or tubular markers are used to channelize pedestrians, they shall be located such that there are no gaps between the bases of the devices, in order to create a continuous bottom, and the height of each individual drum, cone, or tubular marker shall be no less than 900 mm (36 in) to be detectable to users of long canes.

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**Figure 6F-7. Channelizing Devices (Sheet 2 of 2)**



- \* Warning lights (optional)
- \*\* Rail stripe widths shall be 150 mm (6 in), except that 100 mm (4 in) wide stripes may be used if rail lengths are less than 900 mm (36 in). The sides of barricades facing traffic shall have retroreflective rail faces.

Note: If barricades are used to channelize pedestrians, there shall be continuous detectable bottom and top rails with no gaps between individual barricades to be detectable to users of long canes. The bottom of the bottom rail shall be no higher than 150 mm (6 in) above the ground surface. The top of the top rail shall be no lower than 900 mm (36 in) above the ground surface.

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



C9A (CA)



C12 (CA)



C17 (CA) (Front)



C17 (CA) (Back)



C20A (CA)



C20B (CA)



C23B (CA)



C24 (CA)



C27 (CA)



C29 (CA)



C30 (CA)



C30A (CA)



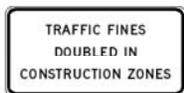
C31A (CA)



C37 (CA)



C38 (CA)



C40 (CA)



C40A (CA)



SC3 (CA)



SC5 (CA)



SC6A (CA)



SC6B (CA)



SC6-3 (CA)



SC6-4 (CA)



SC7 (CA)

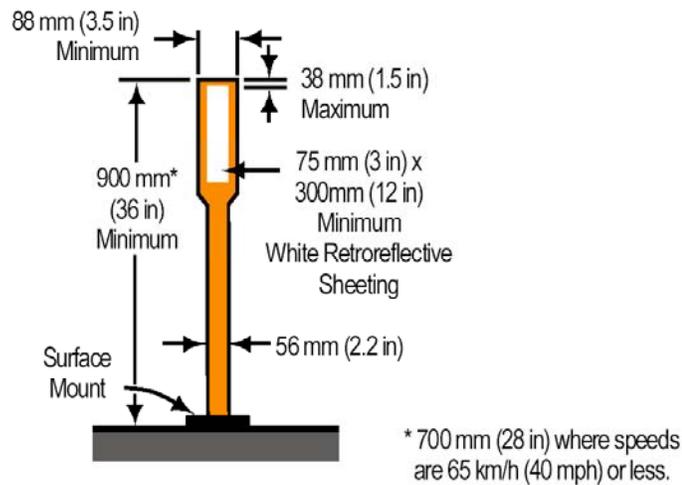


SC8 (CA)

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



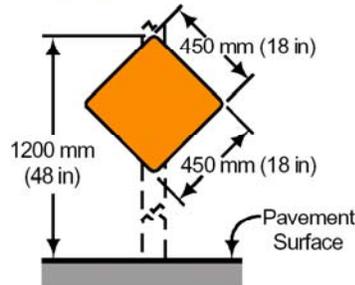
**Figure 6F-102 (CA). Channelizer**



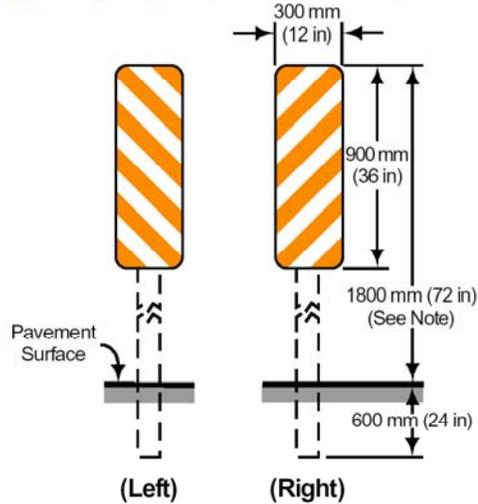
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**Figure 6F-103 (CA). Examples of Object Markers in Temporary Traffic Control Zones**

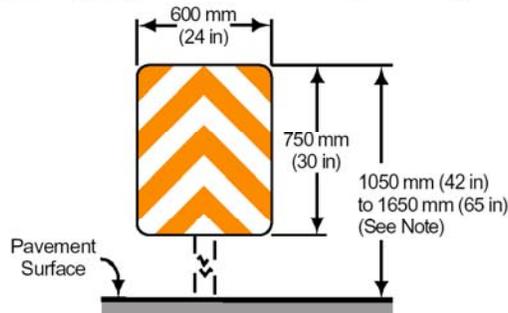
**Type N-3 (CA) Object Marker (OM1-3)**



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



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



Note:  
The bottom of the marker is normally mounted 0.3 m (1 ft) above the pavement surface.

**Table 6F-1. Sizes of Temporary Control Signs (Sheet 1 of 4)**

Sign	MUTCD Code	Conventional Road	Expressway	Freeway	Minimum	Oversized
Stop	R1-1	750 x 750 (30 x 30)	—	—	—	—
Yield	R1-2	900 x 900 x 900 (36 x 36 x 36)	—	—	—	—
To Oncoming Traffic	R1-2a	1200 x 600 (48 x 24)	—	—	—	—
Speed Limit	R2-1	600 x 750 (24 x 30)	—	—	—	—
Speed Limit (metric)	<del>R2-1</del>	<del>600 x 900 (24 x 36)</del>	—	—	—	—
Fines Higher	R2-6	600 x 600 (24 x 24)	—	—	—	—
Turn Prohibition	R3-1,2,3, 4,18	600 x 600 (24 x 24)	—	—	—	—
Mandatory Movement (1 lane)	R3-5	750 x 900 (30 x 36)	—	—	—	—
Optional Movement (1 lane)	R3-6	750 x 900 (30 x 36)	—	—	—	—
Mandatory Movement (text)	R3-7	750 x 750 (30 x 30)	—	—	—	—
Lane Use (2 lanes)	R3-8	750 x 750 (30 x 30)	—	—	—	—
Do Not Pass	R4-1	600 x 750 (24 x 30)	—	—	—	—
Pass With Care	R4-2	600 x 750 (24 x 30)	—	—	—	—
Keep Right	R4-7	600 x 750 (24 x 30)	—	—	—	—
Stay in Lane	R4-9	600 x 750 (24 x 30)	—	—	—	—
Do Not Enter	R5-1	750 x 750 (30 x 30)	—	—	—	—
Wrong Way	R5-1a	900 x 600 (36 x 24)	—	—	—	—
One Way (inside arrow)	R6-1	900 x 300 (36 x 12)	—	—	—	—
One Way (with arrow)	R6-2	450 x 600 (18 x 24)	—	—	—	—
No Parking (symbol)	R8-3a	600 x 600 (24 x 24)	—	—	—	—
Pedestrian Crosswalk	R9-8	900 x 450 (36 x 18)	—	—	—	—
Sidewalk Closed	R9-9	600 x 300 (24 x 12)	—	—	—	—
Sidewalk Closed, Use Other Side	R9-10	600 x 300 (24 x 12)	—	—	—	—
Sidewalk Closed Ahead, Cross Here	R9-11	600 x 300 (24 x 12)	—	—	—	—
Sidewalk Closed, Cross Here	R9-11a	600 x 300 (24 x 12)	—	—	—	—
Road Closed	R11-2	1200 x 750 (48 x 30)	—	(Also see C2(CA) Sign Size)	—	—
Road Closed - Local Traffic Only	R11-3a,4	1500 x 750 (60 X 30)	—	—	—	—
Weight Limit	R12-1,2	600 x 750 (24 x 30)	—	—	—	—
Weight Limit (with symbols)	R12-5	750 x 900 1050 (30 x 36) 42	—	—	—	—
Turn and Curve Signs	W1-1,2,3,4	750 x 750 (30 x 30)	—	—	—	—
Reverse Curve (2 or more lanes)	<del>W1-4b,4e</del>	<del>900 x 900 (36 x 36)</del>	—	(See W1-4 Sign Size)	—	—

**Table 6F-1. Sizes of Temporary Control Signs (Sheet 2 of 4)**

Sign	MUTCD Code	Conventional Road	Expressway	Freeway	Minimum	Oversized
One-Direction Large Arrow	W1-6	1200 x 600 (48 x 24)	—	—	—	—
Chevron	W1-8	900 x 1200 (36 x 48)	—	—	—	—
Stop Ahead (symbol)	W3-1	900 x 900 (36 x 36)	—	—	—	—
Yield Ahead (symbol)	W3-2	900 x 900 (36 x 36)	—	—	—	—
Signal Ahead (symbol)	W3-3	900 x 900 (36 x 36)	—	—	—	—
Be Prepared to Stop	W3-4	900 x 900 (36 x 36)	—	—	—	—
Speed Limit XX Ahead (symbol)	W3-5	900 x 900 (36 x 36)	—	—	—	—
Reduced Speed Zone Ahead	W3-5a	900 x 900 (36 x 36)	—	—	—	—
Merging Traffic	W4-1,5	900 x 900 (36 x 36)	—	—	—	—
Lane Ends (symbol)	W4-2	900 x 900 (36 x 36)	—	—	—	—
Added Lane	W4-3,6	900 x 900 (36 x 36)	—	—	—	—
Thru Traffic Merge Left	W4-7	900 x 900 (36 x 36)	—	—	—	—
Road Narrows	W5-1	900 x 900 (36 x 36)	—	—	—	—
Narrow Bridge	W5-2	900 x 900 (36 x 36)	—	—	—	—
One Lane Bridge	W5-3	900 x 900 (36 x 36)	—	—	—	—
Ramp Narrows	W5-4	<del>900 x 900 (36 x 36)</del>	—	(See W5-1 or C12(CA) Sign Sizes)	—	—
Divided Highway (symbol)	W6-1	900 x 900 (36 x 36)	—	—	—	—
Divided Highway Ends (symbol)	W6-2	900 x 900 (36 x 36)	—	—	—	—
Two-Way Traffic	W6-3	750 x 750 (30 x 30)	—	—	—	—
Two-Way Traffic (plaque)	W6-4	300 x 450 (12 x 18)	—	—	—	—
Hill (symbol)	W7-1	750 x 750 (30 x 30)	—	—	—	—
Bump	W8-1	750 x 750 (30 x 30)	—	—	—	—
Dip	W8-2	750 x 750 (30 x 30)	—	—	—	—
Pavement Ends	W8-3	750 x 750 (30 x 30)	—	—	—	—
Soft Shoulder	W8-4	750 x 750 (30 x 30)	—	—	—	—
Slippery When Wet (symbol)	W8-5	750 x 750 (30 x 30)	—	—	—	—
Truck Crossing	W8-6	750 x 750 (30 x 30)	—	—	—	—
Loose Gravel	W8-7	750 x 750 (30 x 30)	—	—	—	—
Rough Road	W8-8	750 x 750 (30 x 30)	—	—	—	—
Low Shoulder	W8-9	750 x 750 (30 x 30)	—	—	—	—
Shoulder Drop-Off	W8-9a	750 x 750 (30 x 30)	—	—	—	—

**Table 6F-1. Sizes of Temporary Control Signs (Sheet 3 of 4)**

Sign	MUTCD Code	Conventional Road	Expressway	Freeway	Minimum	Oversized
Uneven Lanes	W8-11	900 x 900 (36 x 36)	—	—	—	—
No Center Stripe	W8-12	900 x 900 (36 x 36)	—	—	—	—
Lane Ends	W9-1,2	900 x 900 (36 x 36)	—	—	—	—
Lane Closed Ahead	W9-3	900 x 900 (36 x 36)	—	—	—	—
Center Lane Closed Ahead (symbol)	W9-3a	900 x 900 (36 x 36)	—	—	—	—
Railroad Advance Warning (circular)	W10-1	900 dia. (36 dia.)	—	—	—	—
Truck (symbol)	W11-10	750 x 750 30 x 30	—	—	—	—
Two Arrow	W12-1	600 x 600 (24 x 24)	—	—	—	—
Low Clearance	W12-2	900 x 900 (36 x 36)	—	—	—	—
Advisory Speed (plaque)	W13-1	450 x 450 or 600 x 600 (18 x 18 or 24 x 24)	—	—	—	—
<del>On Ramp (plaque)</del>	<del>W13-4</del>	<del>900 x 900 (36 x 36)</del>	<del>—</del>	<del>—</del>	<del>—</del>	<del>—</del>
No Passing Zone (pennant)	W14-3	900 x 1200 x 1200 (36 x 48 x 48)	—	—	—	—
XX <del>Meters or</del> Feet (plaque)	W16-2	600 x 450 (24 x 18)	—	—	—	—
Road Work (with distance)	W20-1	900 x 900 (36 x 36)	—	(Also See C23(CA) Sign Size)	—	—
Detour (with distance)	W20-2	900 x 900 (36 x 36)	—	—	—	—
Road (Street) Closed (with distance)	W20-3	900 x 900 (36 x 36)	—	(Also See C19(CA) Sign Size)	—	—
One Lane Road (with distance)	W20-4	900 x 900 (36 x 36)	—	—	—	—
Lane(s) Closed (with distance)	W20-5,5a	900 x 900 (36 x 36)	—	(Also See C20(CA) Sign Size)	—	—
<del>Flagger (symbol)</del>	<del>W20-7a</del>	<del>900 x 900 (36 x 36)</del>	<del>—</del>	(See C9A(CA) Sign Size)	—	—
Workers	W21-1	900 x 900 (36 x 36)	—	—	—	—
Workers (symbol)	W21-1a	900 x 900 (36 x 36)	—	—	—	—
Fresh Oil	W21-2	750 x 750 (30 x 30)	—	—	—	—
Road Machinery Ahead	W21-3	900 x 900 (36 x 36)	—	—	—	—
Shoulder Work	W21-5	750 x 750 (30 x 30)	—	—	—	—
Shoulder Closed	W21-5a	750 x 750 (30 x 30)	—	—	—	—
Shoulder Closed (with distance)	W21-5b	900 x 900 (36 x 36)	—	—	—	—
Survey Crew	W21-6	750 x 750 (30 x 30)	—	—	—	—
Utility Work Ahead	W21-7	900 x 900 (36 x 36)	—	—	—	—
Blasting Zone Ahead	W22-1	1200 x 1200 (48 x 48)	—	—	—	—
Turn Off 2-Way Radio and Cell Phone	W22-2	1050 x 900 (42 x 36)	—	—	—	—
End Blasting Zone	W22-3	1050 x 900 (42 x 36)	—	—	—	—

**Table 6F-1. Sizes of Temporary Control Signs (Sheet 4 of 4)**

Sign	MUTCD Code	Conventional Road	Expressway	Freeway	Minimum	Oversized
Slow Traffic Ahead	W23-1	1200 x 600 (48 x 24)	—	(Also See SC12(CA) Sign Size)	—	—
Double Reverse Curve (1 lane)	W24-1	900 x 900 (36 x 36)	—	—	—	—
<del>Double Reverse Curve (2 lanes)</del>	<del>W24-1a</del>	<del>900 x 900 (36 x 36)</del>	—	(See W24-1 Sign Size)	—	—
<del>Double Reverse Curve (3 lanes)</del>	<del>W24-1b</del>	<del>900 x 900 (36 x 36)</del>	—	(See W24-1 Sign Size)	—	—
Road Work Next XX km or Miles	G20-1	900 x 450 (36 x 18)	—	(Also See C11(CA) Sign Size)	—	—
End Road Work	G20-2	900 x 450 (36 x 18)	—	(Also See C14(CA) Sign Size)	—	—
Pilot Car Follow Me	G20-4	900 x 450 (36 x 18)	—	—	—	—
Exit Open	E5-2	1200 x 900 (48 x 36)	—	—	—	—
Exit Closed	E5-2a	1200 x 900 (48 x 36)	—	—	—	—
Exit Only	E5-3	1200 x 900 (48 x 36)	—	—	—	—
Detour (plaque)	M4-8	600 x 300 (24 x 12)	—	—	—	—
End Detour	M4-8a	600 x 450 (24 x 18)	—	—	—	—
End (plaque)	M4-8b	600 x 300 (24 x 12)	—	—	—	—
Detour (with arrow)	M4-9	750 x 600 (30 x 24)	—	—	—	—
Bike/Pedestrian Detour (with arrow)	M4-9a	750 x 600 (30 x 24)	—	—	—	—
Pedestrian Detour (with arrow)	M4-9b	750 x 600 (30 x 24)	—	—	—	—
Bike Detour (with arrow)	M4-9c	750 x 600 (30 x 24)	—	—	—	—
Detour (inside arrow)	M4-10	1200 x 450 (48 x 18)	—	—	—	—

Notes:

1. Larger signs may be used wherever necessary for greater legibility or emphasis.
2. Dimensions are shown in millimeters followed by inches in parentheses and are shown as width x height.
3. For freeways and expressways, the size of diamond shaped TTC warning signs shall be a minimum of 1200 x 1200 mm (48 x 48 in).

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Table 6F-1(CA). Sizes of California Temporary Traffic Control Signs

Sign (MUTCD Code, if any)	California Code	Conventional Road	Expressway	Freeway	Minimum	Oversized
Flagger Symbol	C9A(CA)	36 x 36	48 x 48	48 x 48	---	---
NARROW LANE(S)	C12(CA)	36 x 36	48 x 48	48 x 48	---	---
Road Work/Speed Limit	C17(CA)	24 x 24	24 x 24	24 x 24	---	---
RIGHT LANE CLOSED AHEAD	C20(CA)	36 x 36	48 x 48	48 x 48	---	72 x 72
LEFT Plaque	C20A(CA)	16 x 7	19 x 8	19 x 8	---	33 x 10
Numeral Plaque	C20B(CA)	6 x 8	8 x 10	8 x 10	---	10 x 12
ROAD (STREET) WORK Informational Plaque	C23B(CA)	Var x 18	Var x 24	Var x 24	---	---
SHOULDER WORK AHEAD	C24(CA)	30 x 30	48 x 48	48 x 48	---	---
OPEN TRENCH	C27(CA)	36 x 36	48 x 48	48 x 48	---	---
XXXX FT	C29(CA)	20 x 7	36 x 9	36 x 9	---	---
LANE CLOSED	C30(CA)	30 x 30	48 x 48	48 x 48	---	---
SHOULDER CLOSED	C30A(CA)	30 x 30	48 x 48	48 x 48	---	---
NO SHOULDER	C31A(CA)	36 x 36	48 x 48	48 x 48	---	---
TRAFFIC CONTROL - WAIT AND FOLLOW PILOT CAR	C37(CA)	36 x 42	36 x 42	36 x 42	---	---
USE NEXT EXIT	C38(CA)	48 x 36	48 x 36	48 x 36	---	---
TRAFFIC FINES DOUBLED IN CONSTRUCTION ZONES	C40(CA)	108 x 42	144 x 60	144 x 60	---	---
TRAFFIC FINES DOUBLED IN WORK ZONES	C40A(CA)	36 x 36	48 x 48	48 x 48	---	---
DETOUR with Arrow	SC3(CA)	36 x 12	---	---	---	48 x 18
SPECIAL EVENT AHEAD	SC5(CA)	36 x 36	48 x 48	48 x 48	---	---
RAMP CLOSED (Not more than one day)	SC6-3(CA)	48 x 48	48 x 48	48 x 48	---	---
RAMP CLOSED (More than one day)	SC6-4(CA)	48 x 60	48 x 60	48 x 60	---	---
XXX month	SC6A(CA)	12 x 6	12 x 6	12 x 6	---	---
XX day	SC6B(CA)	6 x 6	6 x 6	6 x 6	---	---
RAMP CLOSED, USE RAMP AT _____	SC7(CA)	84 x 42	84 x 42	84 x 42	---	---
____ EXIT - RAMP CLOSED	SC8(CA)	84 x 42	84 x 42	84 x 42	---	---
FWY DETOUR with Arrow	SC9(CA)	36 x 36	---	---	---	---
LANE CLOSED AHEAD	SC10(CA)	48 x 30	66 x 36	66 x 36	---	---
LANE CLOSED	SC11(CA)	42 x 30	54 x 42	54 x 42	---	---
DO NOT PASS	SC13(CA)	42 x 30	54 x 42	54 x 42	---	---
CAUTION	SC15(CA)	42 x 18	54 x 24	54 x 24	---	---
RAMP CLOSED (R11-2)	<del>C2(CA)</del>	48 x 30	48 x 30	48 x 30	---	---
ROAD CONSTRUCTION NEXT XX MILES (G20-1)	<del>C11(CA)</del>	60 x 36	90 x 48	90 x 48	---	---
END ROAD WORK (G20-2)	<del>C14(CA)</del>	36 x 18	48 x 24	48 x 24	---	---
RAMP CLOSED AHEAD (W20-3)	<del>C19(CA)</del>	36 x 36	48 x 48	48 x 48	---	---
RAMP WORK AHEAD (W20-1)	<del>C23(CA)</del>	30 x 30	48 x 48	48 x 48	---	---
SLOW TRAFFIC AHEAD (W23-1)	<del>SC12(CA)</del>	54 x 30	72 x 42	72 x 42	---	---

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

California Code	MUTCD Code	Title of Sign	California MUTCD Section
C1(CA)	W20-2	DETOUR	6F.18
C2(CA)	R11-2	ROAD (STREET) CLOSED	6F.08, 6F.28, 6F.53, 2B.48
C3(CA)	R11-3a	ROAD CLOSED XX MILES AHEAD, LOCAL TRAFFIC ONLY	6F.09, 6F.53, 2B.48
C3A(CA)	R11-4	ROAD (STREET) CLOSED TO THRU TRAFFIC	6F.09, 6F.53, 2B.48
C4(CA)	W21-2	FRESH OIL (TAR)	6F.32
C5(CA)	M4-10	Detour Arrow	6F.03, 6F.53
C5A(CA)	M4-8	DETOUR	6F.53, 6G.10
C6(CA)	W8-7	LOOSE GRAVEL	6F.102(CA)
C7(CA)	M4-8a	END DETOUR	6F.53
C8(CA)	W21-3	ROAD MACHINERY AHEAD	6F.33
C9A(CA)	None	Flagger Symbol	6F.29
C11(CA)	G20-1	ROAD WORK NEXT XX MILES	6F.51
C12(CA)	None	NARROW LANE(S)	6F.26, 6F.103(CA)
C14(CA)	G20-2	END ROAD WORK	6F.52
C16(CA)	W20-4	ONE LANE ROAD	6F.20
C17(CA)	None	Road Work/Speed Limit	6F.104(CA)
C19(CA)	W20-3	ROAD (STREET) CLOSED	6F.19
C20(CA)	None	RIGHT LANE CLOSED AHEAD	6F.21
C20A(CA)	None	LEFT Plaque	6F.21
C20B(CA)	None	Numeral Plaque	6F.21
C22B(CA)	W21-1a	Workers	6F.31, 6G.06
C22C(CA)	W21-1	WORKERS	6F.31
C23(CA)	W20-1	ROAD (STREET) WORK	6F.17, 6F.27, 6F.37, 6F.72
C23B(CA)	None	ROAD (STREET) WORK Informational Plaque	6F.17
C24(CA)	None	SHOULDER WORK AHEAD	6F.35
C25(CA)	W21-6	SURVEY CREW	6F.36
C26(CA)	G20-4	PILOT CAR FOLLOW ME	6C.13, 6F.54
C27(CA)	None	OPEN TRENCH	6F.105(CA)
C28A(CA)	Not Assigned	STOP Paddle	6E.03, 6E.04, 7E.05, 7E.09
C28B(CA)	Not Assigned	SLOW Paddle	6E.03, 6E.04
C28C(CA)	None	Short and Long Handle (for STOP/SLOW Paddle) Details	6E.03, 7E.05
C29(CA)	None	XXX FT	6F.49
C30(CA)	None	LANE CLOSED	6F.21
C30A(CA)	None	SHOULDER CLOSED	6F.35
C30B(CA)	W21-5b	RIGHT (LEFT) SHOULDER CLOSED XXX FT	6F.35
C31(CA)	W8-9	LOW SHOULDER	6F.42, 6F.105(CA), 2C.26
C31A(CA)	None	NO SHOULDER	6F.42, 6F.105(CA)
C33(CA)	W22-1	BLASTING ZONE AHEAD	6F.39
C34(CA)	W22-2	TURN OFF 2-WAY RADIO AND PHONE	6F.40
C35(CA)	W22-3	END BLASTING ZONE	6F.41
C36(CA)	W3-4	BE PREPARED TO STOP	6F.29, 2C.29
C37(CA)	None	TRAFFIC CONTROL – WAIT AND FOLLOW PILOT CAR	6F.54
C38(CA)	None	USE NEXT EXIT	6F.28

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

California Code	MUTCD Code	Title of Sign	California MUTCD Section
C40(CA)	None	TRAFFIC FINES DOUBLED IN CONSTRUCTION ZONES	6F.106(CA)
C40A(CA)	None	TRAFFIC FINES DOUBLED IN WORK ZONES	6F.106(CA)
<del>C42(CA)</del>	R9-11a	SIDEWALK CLOSED, (ARROW) CROSS HERE	6F.103(CA), 6F.13
SC3(CA)	None	DETOUR with Arrow	6F.53
SC5(CA)	None	SPECIAL EVENT AHEAD	6F.17
SC6A(CA)	None	Day/Month Plaque	6F.28
SC6B(CA)	None	Time Plaque	6F.28
SC6-3(CA)	None	RAMP CLOSED (Not more than one day)	6F.28
SC6-4(CA)	None	RAMP CLOSED (More than one day)	6F.28
SC7(CA)	None	RAMP CLOSED, USE RAMP AT ____	6F.28
SC8(CA)	None	____ EXIT - RAMP CLOSED	6F.28
SC9(CA)	None	FWY DETOUR with Arrow	6F.53
SC10(CA)	None	LANE CLOSED AHEAD	6F.107(CA)
SC11(CA)	None	LANE CLOSED	6F.107(CA)
<del>SC12(CA)</del>	W23-1	SLOW TRAFFIC AHEAD	6F.107(CA), 6F.27
SC13(CA)	None	DO NOT PASS	6F.107(CA)
SC15(CA)	None	CAUTION	6F.107(CA)
<del>SC16(CA)</del>	W8-12	NO CENTER STRIPE	6F.44

*(This space left intentionally blank)*

Table 6F-102(CA). Maximum Spacing of Channelizing Devices

Speed (km/h)	Maximum Channelizer Spacing		
	Taper* (m)	Tangent (m)	Conflict** (m)
30	6	12	3
40	8	16	4
50	10	20	5
60	12	24	6
70	14	28	7
80	16	32	8
90	18	36	9
100	20	40	10
110	22	44	11

Speed (mph)	Maximum Channelizer Spacing		
	Taper* (ft)	Tangent (ft)	Conflict** (ft)
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	55	110	27
60	60	120	30
65	65	130	32
70	70	140	35

\* Maximum channelizer spacing for all speeds on one-lane/two-way tapers is 6.1 m (20 ft).  
Maximum channelizer spacing for all speeds on downstream tapers is 6.1 m (20 ft).  
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 channelizers

## CHAPTER 6G. TYPE OF TEMPORARY TRAFFIC CONTROL ZONE ACTIVITIES

### **Section 6G.01 Typical Applications**

Support:

Whenever the acronym "TTC" is used in this Chapter, it refers to "temporary traffic control".

**Standard:**

**The needs and control of all road users (motorists, bicyclists, and pedestrians within the highway, including persons with disabilities in accordance with the Americans with Disabilities Act of 1990 (ADA), Title II, Paragraph 35.130) through a TTC zone shall be an essential part of highway construction, utility work, maintenance operations, and the management of traffic incidents.**

Support:

Each TTC zone is different. Many variables, such as location of work, highway type, geometrics, vertical and horizontal alignment, intersections, interchanges, road user volumes, road vehicle mix (buses, trucks, and cars), and road user speeds affect the needs of each zone. The goal of TTC in work zones is safety with minimum disruption to road users. The key factor in promoting TTC zone safety is proper judgment.

Typical applications (TAs) of TTC zones are organized according to duration, location, type of work, and highway type. Table 6H-1 is an index of these typical applications. These typical applications include the use of various TTC methods, but do not include a layout for every conceivable work situation.

Guidance:

Typical applications should be altered, when necessary, to fit the conditions of a particular TTC zone.

Option:

Other devices may be added to supplement the devices shown in the typical applications, while others may be deleted. The sign spacings and taper lengths may be increased to provide additional time or space for driver response.

Support:

Decisions regarding the selection of the most appropriate typical application to use as a guide for a specific TTC zone require an understanding of each situation. Although there are many ways of categorizing TTC zone applications, the four factors mentioned earlier (work duration, work location, work type, and highway type) are used to characterize the typical applications illustrated in Chapter 6H.

### **Section 6G.02 Work Duration**

Support:

Chapter 6D and Sections 6F.68 and 6G.05 contain additional information regarding the steps to follow when pedestrian or bicycle facilities are affected by the worksite.

Work duration is a major factor in determining the number and types of devices used in TTC zones. The duration of a TTC zone is defined relative to the length of time a work operation occupies a spot location.

**Standard:**

**The five categories of work duration and their time at a location shall be:**

- A. Long-term stationary is work that occupies a location more than 3 days.**
- B. Intermediate-term stationary is work that occupies a location more than one daylight period up to 3 days, or nighttime work lasting more than 1 hour.**
- C. Short-term stationary is daytime work that occupies a location for more than 1 hour within a single daylight period.**
- D. Short duration is work that occupies a location up to 1 hour.**
- E. Mobile is work that moves intermittently or continuously.**

Support:

At long-term stationary TTC zones, there is ample time to install and realize benefits from the full range of TTC procedures and devices that are available for use. Generally, larger channelizing devices, temporary roadways, and temporary traffic barriers are used.

**Standard:**

**Since long-term operations extend into nighttime, retroreflective and/or illuminated devices shall be used in long-term stationary TTC zones.**

**Guidance:**

Inappropriate markings in long-term stationary TTC zones should be removed and replaced with temporary markings.

**Support:**

In intermediate-term stationary TTC zones, it might not be feasible or practical to use procedures or devices that would be desirable for long-term stationary temporary traffic control zones, such as altered pavement markings, temporary traffic barriers, and temporary roadways. The increased time to place and remove these devices in some cases could significantly lengthen the project, thus increasing exposure time. In other instances, there might be insufficient pay-back time to economically justify more elaborate TTC measures.

**Standard:**

**Since intermediate-term operations extend into nighttime, retroreflective and/or illuminated devices shall be used in intermediate-term stationary TTC zones.**

**Support:**

Most maintenance and utility operations are short-term stationary work.

As compared to stationary operations, mobile and short-duration operations are activities that might involve different treatments. Devices having greater mobility might be necessary such as signs mounted on trucks. Devices that are larger, more imposing, or more visible can be used effectively and economically. The mobility of the TTC zone is important.

Maintaining reasonably safe work and road user conditions is a paramount goal in carrying out mobile operations.

**Guidance:**

Safety in short-duration or mobile operations should not be compromised by using fewer devices simply because the operation will frequently change its location.

**Option:**

Appropriately colored or marked vehicles with high-intensity rotating, flashing, oscillating, or strobe lights may be used in place of signs and channelizing devices for short-duration or mobile operations. These vehicles may be augmented with signs or arrow panels.

**Support:**

During short-duration work, it often takes longer to set up and remove the TTC zone than to perform the work. Workers face hazards in setting up and taking down the TTC zone. Also, since the work time is short, delays affecting road users are significantly increased when additional devices are installed and removed.

**Option:**

Considering these factors, simplified control procedures may be warranted for short-duration work. A reduction in the number of devices may be offset by the use of other more dominant devices such as high-intensity rotating, flashing, oscillating, or strobe lights on work vehicles.

**Support:**

Mobile operations often involve frequent short stops for activities such as litter cleanup, pothole patching, or utility operations, and are similar to short-duration operations.

**Guidance:**

Warning signs, high-intensity rotating, flashing, oscillating, or strobe lights on a vehicle, flags, and/or channelizing devices should be used and moved periodically to keep them near the mobile work area.

**Option:**

Flaggers may be used for mobile operations that often involve frequent short stops.

**Support:**

Mobile operations also include work activities where workers and equipment move along the road without stopping, usually at slow speeds. The advance warning area moves with the work area.

**Guidance:**

When mobile operations are being performed, a shadow vehicle equipped with an arrow panel or a sign should follow the work vehicle, especially when vehicular traffic speeds or volumes are high. Where feasible, warning signs should be placed along the roadway and moved periodically as work progresses.

Under high-volume conditions, consideration should be given to scheduling mobile operations work during off-peak hours.

If there are mobile operations on a high-speed travel lane of a multi-lane divided highway, arrow panels should be used.

**Option:**

For mobile operations that move at speeds less than 5 km/h (3 mph), mobile signs or stationary signing that is periodically retrieved and repositioned in the advance warning area may be used.

At higher speeds, vehicles may be used as components of the TTC zones for mobile operations. Appropriately colored and marked vehicles with signs, flags, high-intensity rotating, flashing, oscillating, or strobe lights, truck-mounted attenuators, and arrow panels or portable changeable message signs may follow a train of moving work vehicles.

For some continuously moving operations, such as street sweeping and snow removal, a single work vehicle with appropriate warning devices on the vehicle may be used to provide warning to approaching road users.

**Standard:**

**Mobile operations that move at speeds greater than 30 km/h (20 mph), such as pavement marking operations, shall have appropriate devices on the equipment (that is, high-intensity rotating, flashing, oscillating, or strobe lights, signs, or special lighting), or shall use a separate vehicle with appropriate warning devices.**

**Section 6G.03 Location of Work**

**Support:**

Chapter 6D and Sections 6F.68 and 6G.05 contain additional information regarding the steps to follow when pedestrian or bicycle facilities are affected by the worksite.

The choice of TTC needed for a TTC zone depends upon where the work is located. As a general rule, the closer the work is to road users (including bicyclists and pedestrians), the greater the number of TTC devices that are needed. Procedures are described later in this Chapter for establishing TTC zones in the following locations:

- A. Outside the shoulder;
- B. On the shoulder with no encroachment;
- C. On the shoulder with minor encroachment;
- D. Within the median; and
- E. Within the traveled way.

**Standard:**

**When the work space is within the traveled way, except for short-duration and mobile operations, advance warning shall provide a general message that work is taking place and shall supply information about highway conditions. TTC devices shall indicate how vehicular traffic can move through the TTC zone.**

**Section 6G.04 Modifications To Fulfill Special Needs**

**Support:**

Chapter 6D and Sections 6F.68 and 6G.05 contain additional information regarding the steps to follow when pedestrian or bicycle facilities are affected by the worksite.

The typical applications in Chapter 6H illustrate commonly encountered situations in which TTC devices are employed.

Option:

Other devices may be added to supplement the devices indicated in the typical applications, and device spacing may be adjusted to provide additional reaction time. When conditions are less complex than those depicted in the typical applications, fewer devices may be needed.

Guidance:

When conditions are more complex, typical applications should be modified by giving particular attention to the provisions set forth in Chapter 6B and by incorporating appropriate devices and practices from the following list:

A. Additional devices:

1. Signs
2. Arrow panels
3. More channelizing devices at closer spacing (see Section 6F.68 for information regarding detectable edging for pedestrians)
4. Temporary raised pavement markers
5. High-level warning devices
6. Portable changeable message signs
7. Temporary traffic control signals (including pedestrian signals and accessible pedestrian signals).
8. Temporary traffic barriers
9. Crash cushions
10. Screens
11. Rumble strips
12. More delineation

B. Upgrading of devices:

1. A full complement of standard pavement markings
2. Brighter and/or wider pavement markings
3. Larger and/or brighter signs
4. Channelizing devices with greater conspicuity
5. Temporary traffic barriers in place of channelizing devices

C. Improved geometrics at detours or crossovers

D. Increased distances:

1. Longer advance warning area
2. Longer tapers

E. Lighting:

1. Temporary roadway lighting
2. Steady-burn lights used with channelizing devices
3. Flashing lights for isolated hazards
4. Illuminated signs
5. Floodlights

Where pedestrian or bicycle usage is high, typical applications should also be modified by giving particular attention to the provisions set forth in Chapter 6D, Section 6F.68, and other Sections of Part 6 related to accessibility and detectability provisions in TTC zones.

### **Section 6G.05 Work Affecting Pedestrian and Bicycle Facilities**

Support:

It is not uncommon, particularly in urban areas, that road work and the associated TTC will affect existing pedestrian or bicycle facilities. It is essential that the needs of all road users, including pedestrians with disabilities, are considered in TTC zones.

In addition to specific provisions identified in Sections 6G.06, 6G.07, 6G.08, 6G.10, 6G.11, 6G.12, and 6G.13, there are a number of provisions that might be applicable for all of the types of activities identified in this Chapter.

**Guidance:**

Where pedestrian or bicycle usage is high, the typical applications should be modified by giving particular attention to the provisions set forth in Chapters 6D and 6G, Section 6F.68, and in other Sections of Part 6 related to accessibility and detectability provisions in TTC zones.

Pedestrians should be separated from the worksite by appropriate devices that maintain the accessibility and detectability for pedestrians with disabilities.

Bicyclists and pedestrians should not be exposed to unprotected excavations, open utility access, overhanging equipment, or other such conditions.

Except for short duration and mobile operations, when a highway shoulder is occupied, a SHOULDER WORK sign should be placed in advance of the activity area. When work is performed on a paved shoulder 2.4 m (8 ft) or more in width, channelizing devices should be placed on a taper having a length that conforms to the requirements of a shoulder taper. Signs should be placed such that they do not narrow any existing pedestrian passages to less than 1200 mm (48 in).

Pedestrian detours should be avoided since pedestrians rarely observe them and the cost of providing accessibility and detectability might outweigh the cost of maintaining a continuous route. Whenever possible, work should be done in a manner that does not create a need to detour pedestrians from existing routes or crossings.

**Standard:**

**Where pedestrian routes are closed, alternate pedestrian routes shall be provided.**

**When existing pedestrian facilities are disrupted, closed, or relocated in a TTC zone, the temporary facilities shall be detectable and shall include accessibility features consistent with the features present in the existing pedestrian facility.**

**Section 6G.06 Work Outside of Shoulder**

**Support:**

Chapter 6D and Sections 6F.68 and 6G.05 contain additional information regarding the steps to follow when pedestrian or bicycle facilities are affected by the worksite.

When work is being performed off the roadway (beyond the shoulders, but within the right-of-way), little or no TTC might be needed. TTC generally is not needed where work is confined to an area 4.6 m (15 ft) or more from the edge of the traveled way. However, TTC is appropriate where distracting situations exist, such as vehicles parked on the shoulder, vehicles accessing the work site via the highway, and equipment traveling on or crossing the roadway to perform the work operations (for example, mowing). For work beyond the shoulder, see Figure ~~6H-1~~ 6H-1(CA).

**Guidance:**

Where the above situations exist, a single warning sign, such as ~~ROAD WORK AHEAD~~, Workers (W21-1a) sign, should be used. If the equipment travels on the roadway, the equipment should be equipped with appropriate flags, high-intensity rotating, flashing, oscillating, or strobe lights, and/or a SLOW MOVING VEHICLE sign.

**Support:**

Refer to Section 6F.31 for Workers (W21-1a) sign.

**Option:**

If work vehicles are on the shoulder, a SHOULDER WORK sign may be used. For mowing operations, the sign MOWING AHEAD may be used.

Where the activity is spread out over a distance of more than 3.2 km (2 mi), the SHOULDER WORK sign may be repeated every 1.6 km (1 mi).

A supplementary plaque with the message NEXT X ~~km~~ (MILES) may be used.

**Guidance:**

A general warning sign like ROAD MACHINERY AHEAD should be used if workers and equipment must occasionally move onto the shoulder.

### **Section 6G.07 Work on the Shoulder with No Encroachment**

**Support:**

Chapter 6D and Sections 6F.68 and 6G.05 contain additional information regarding the steps to follow when pedestrian or bicycle facilities are affected by the worksite.

The provisions of this Section apply to short-term through long-term stationary operations.

**Standard:**

**When paved shoulders having a width of 2.4 m (8 ft) or more are closed, at least one advance warning sign shall be used. In addition, channelizing devices shall be used to close the shoulder in advance to delineate the beginning of the work space and direct motor vehicle traffic to remain within the traveled way.**

**Guidance:**

When paved shoulders having a width of 2.4 m (8 ft) or more are closed on freeways and expressways, road users should be warned about potential disabled vehicles that cannot get off the traveled way. An initial general warning sign (such as ROAD WORK AHEAD) should be used, followed by a RIGHT or LEFT SHOULDER CLOSED sign. Where the end of the shoulder closure extends beyond the distance which can be perceived by road users, a supplementary plaque bearing the message NEXT X METERS (FEET) or km (MILES) should be placed below the SHOULDER CLOSED sign. On multi-lane, divided highways, signs advising of shoulder work or the condition of the shoulder should be placed only on the side of the affected shoulder.

When an improved shoulder is closed on a high-speed roadway, it should be treated as a closure of a portion of the road system because road users expect to be able to use it in emergencies. Road users should be given ample advance warning that shoulders are closed for use as refuge areas throughout a specified length of the approaching TTC zone. The sign(s) should read SHOULDER CLOSED with distances indicated. The work space on the shoulder should be closed off by a taper or channelizing devices with a length of 0.33 L using the formulas in Table 6C-3.

When the shoulder is not occupied but work has adversely affected its condition, the LOW SHOULDER or SOFT SHOULDER sign should be used, as appropriate.

Where the condition extends over a distance in excess of 1.6 km (1 mi), the sign should be repeated at 1.6 km (1 mi) intervals.

**Option:**

In addition, a supplementary plaque bearing the message NEXT X km (MILES) may be used. Temporary traffic barriers may be needed to inhibit encroachment of errant vehicles into the work space and to protect workers.

**Standard:**

**When used for shoulder work, arrow panels shall operate only in the caution mode.**

**Support:**

A typical application for stationary work operations on shoulders is shown in Figure 6H-3. Short duration or mobile work on shoulders is shown in Figure ~~6H-4~~ 6H-4(CA). Work on freeway shoulders is shown in Figure ~~6H-5~~ 6H-5(CA).

### **Section 6G.08 Work on the Shoulder with Minor Encroachment**

**Support:**

Chapter 6D and Sections 6F.68 and 6G.05 contain additional information regarding the steps to follow when pedestrian or bicycle facilities are affected by the worksite.

**Guidance:**

When work takes up part of a lane, vehicular traffic volumes, vehicle mix (buses, trucks, cars, and bicycles), speed, and capacity should be analyzed to determine whether the affected lane should be closed. Unless the lane encroachment permits a remaining lane width of 3 m (10 ft), the lane should be closed.

Truck off-tracking should be considered when determining whether the minimum lane width of 3 m (10 ft) is adequate.

**Option:**

A lane width of 2.7 m (9 ft) may be used for short-term stationary work on low-volume, low-speed roadways when vehicular traffic does not include longer and wider heavy commercial vehicles.

**Support:**

Figure 6H-6 illustrates a method for handling vehicular traffic where the stationary or short duration work space encroaches slightly into the traveled way.

**Section 6G.09 Work Within the Median**

**Support:**

Chapter 6D and Sections 6F.68 and 6G.05 contain additional information regarding the steps to follow when pedestrian or bicycle facilities are affected by the worksite.

**Guidance:**

If work in the median of a divided highway is within 4.6 m (15 ft) from the edge of the traveled way for either direction of travel, TTC should be used through the use of advance warning signs and channelizing devices.

**Section 6G.10 Work Within the Traveled Way of Two-Lane Highways**

**Support:**

Chapter 6D and Sections 6F.68 and 6G.05 contain additional information regarding the steps to follow when pedestrian or bicycle facilities are affected by the worksite.

Detour signs are used to direct road users onto another roadway. At diversions, road users are directed onto a temporary roadway or alignment placed within or adjacent to the right-of-way. Typical applications for detouring or diverting road users on two-lane highways are shown in Figures ~~6H-7~~ 6H-7(CA), 6H-8, and 6H-9. Figure ~~6H-7~~ 6H-7(CA) illustrates the controls around an area where a section of roadway has been closed and a diversion has been constructed. Channelizing devices and pavement markings are used to indicate the transition to the temporary roadway.

**Guidance:**

When a detour is long, Detour (M4-8, M4-9) signs should be installed to remind and reassure road users periodically that they are still successfully following the detour.

When an entire roadway is closed, as illustrated in Figure 6H-8, a detour should be provided and road users should be warned in advance of the closure, which in this example is a closure 16 km (10 mi) from the intersection. If local road users are allowed to use the roadway up to the closure, the ROAD CLOSED AHEAD, LOCAL TRAFFIC ONLY sign should be used. The portion of the road open to local road users should have adequate signing, marking, and delineation.

Detours should be signed so that road users will be able to traverse the entire detour route and back to the original roadway as shown in Figure 6H-9.

**Support:**

Techniques for controlling vehicular traffic under one-lane, two-way conditions are described in Section 6C.10.

**Option:**

Flagger may be used as shown in Figure ~~6H-10~~ 6H-10(CA).

STOP/YIELD sign control may be used on roads with low traffic volumes as shown in Figure 6H-11.

A temporary traffic control signal may be used as shown in Figure ~~6H-12~~ 6H-12(CA).

**Support:**

Refer to CVC 21363 for detour signs.

**Section 6G.11 Work Within the Traveled Way of Urban Streets**

**Support:**

Chapter 6D and Sections 6F.68 and 6G.05 contain additional information regarding the steps to follow when pedestrian or bicycle facilities are affected by the worksite.

In urban TTC zones, decisions are needed on how to control vehicular traffic, such as how many lanes are required, whether any turns need to be prohibited at intersections, and how to maintain access to business, industrial, and residential areas.

Pedestrian traffic needs separate attention. Chapter 6D contains information regarding pedestrian movements near TTC zones.

**Standard:**

**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.**

**If the TTC zone affects the movement of bicyclists, adequate access to the roadway or shared-use paths shall be provided (see Part 9).**

**Where transit stops are affected or relocated because of work activity, access to temporary transit stops shall be provided.**

**Guidance:**

If a designated bicycle route is closed because of the work being done, a signed alternate route should be provided. Bicyclists should not be directed onto the path used by pedestrians.

Work sites within the intersection should be protected against inadvertent pedestrian incursion by providing detectable channelizing devices.

**Support:**

Utility work takes place both within and outside the roadway to construct and maintain services such as power, gas, light, water, or telecommunications. Operations often involve intersections, since that is where many of the network junctions occur. The work force is usually small, only a few vehicles are involved, and the number and types of TTC devices placed in the TTC zone is usually minimal.

**Standard:**

**All TTC devices shall be retroreflective or illuminated if utility work is performed during nighttime hours.**

**Guidance:**

As discussed under short-duration projects, however, the reduced number of devices in utility work zones should be offset by the use of high-visibility devices, such as high-intensity rotating, flashing, oscillating, or strobe lights on work vehicles or high-level warning devices.

**Support:**

Figures 6H-6, ~~6H-10~~ 6H-10(CA), 6H-15, 6H-18, 6H-21, 6H-22, 6H-23, 6H-26, and 6H-33 are examples of typical applications for utility operations. Other typical applications might apply as well.

**Section 6G.12 Work Within the Traveled Way of Multi-lane, Nonaccess Controlled Highways**

**Support:**

Chapter 6D and Sections 6F.68 and 6G.05 contain additional information regarding the steps to follow when pedestrian or bicycle facilities are affected by the worksite.

Work on multi-lane (two or more lanes of moving motor vehicle traffic in one direction) highways is divided into right-lane closures, left-lane closures, interior-lane closures, multiple-lane closures, and closures on five-lane roadways.

**Standard:**

**When a lane is closed on a multi-lane road for other than a mobile operation, a transition area containing a merging taper shall be used.**

**Guidance:**

When justified by an engineering study, temporary traffic barriers should be used to prevent incursions of errant vehicles into hazardous areas or work space.

**Standard:**

**When temporary traffic barriers are placed immediately adjacent to the traveled way, they shall be equipped with appropriate channelizing devices, delineation, and/or other TTC devices. For lane closures, the merging taper shall use channelizing devices and the temporary traffic barrier shall be placed beyond the transition area.**

**Support:**

It must be recognized that although temporary traffic barriers are shown in several of the typical applications of Chapter 6H, they are not considered to be TTC devices in themselves.

Figure 6H-34 illustrates a lane closure in which temporary traffic barriers are used.

**Option:**

When the right lane is closed, TTC similar to that shown in Figure 6H-33 may be used for undivided or divided four-lane roads.

**Guidance:**

If morning and evening peak hour vehicular traffic volumes in the two directions are uneven and the greater volume is on the side where the work is being done in the right lane, consideration should be given to closing the inside lane for opposing vehicular traffic and making the lane available to the side with heavier vehicular traffic, as shown in Figure ~~6H-31~~ 6H-31(CA).

If the larger vehicular traffic volume changes to the opposite direction at a different time of the day, the TTC should be changed to allow two lanes for opposing vehicular traffic by moving the devices from the opposing lane back to the centerline. When it is necessary to create a temporary centerline that is not consistent with the pavement markings, channelizing devices should be used and closely spaced.

**Option:**

When closing a left lane on a multi-lane undivided road, as vehicular traffic flow permits, the two interior lanes may be closed, as shown in Figure 6H-30, to provide drivers and workers additional lateral clearance and to provide access to the work space.

**Standard:**

**When only the left lane is closed on undivided roads, channelizing devices shall be placed along the centerline as well as along the adjacent lane.**

**Guidance:**

When an interior lane is closed, an adjacent lane should also be considered for closure to provide additional space for vehicles and materials and to facilitate the movement of equipment within the work space.

When multiple lanes in one direction are closed, a capacity analysis should be made to determine the number of lanes needed to accommodate motor vehicle traffic needs. Vehicular traffic should be moved over one lane at a time. ~~As shown in Figure 6H-37, the~~ tapers should be separated by a distance of 2L, with L being determined by the formulas in Table 6C-3.

**Standard:**

**When a directional roadway is closed, inapplicable WRONG WAY signs and markings, and other existing traffic control devices at intersections within the temporary two-lane, two-way operations section shall be covered, removed, or obliterated.**

**Option:**

When half the road is closed on an undivided highway, both directions of vehicular traffic may be accommodated as shown in Figure ~~6H-32~~ 6H-32(CA). When both interior lanes are closed, temporary traffic controls may be used as indicated in Figure 6H-30. When a roadway must be closed on a divided highway, a median crossover may be used (see Section ~~6G.15~~ 6G.16).

**Support:**

TTC for lane closures on five-lane roads is similar to other multi-lane undivided roads. Figure ~~6H-32~~ 6H-32(CA) can be adapted for use on five-lane roads. Figure 6H-35 can be used on a five-lane road for short duration and mobile operations.

**Guidance:**

When multiple lanes in one direction are closed, traffic should be moved over one lane at a time as shown in Department of Transportation's Standard Plan T10. See Section 1A.11 for information regarding this publication.

### **Section 6G.13 Work Within the Traveled Way at an Intersection**

**Support:**

Chapter 6D and Sections 6F.68 and 6G.05 contain additional information regarding the steps to follow when pedestrian or bicycle facilities are affected by the worksite.

The typical applications for intersections are classified according to the location of the work space with respect to the intersection area (as defined by the extension of the curb or edge lines). The three classifications are near side, far side, and in-the-intersection. Work spaces often extend into more than one portion of the intersection. For example, work in one quadrant often creates a near-side work space on one street and a far-side work space on the cross street. In such instances, an appropriate TTC plan is obtained by combining features shown in two or more of the intersection and pedestrian typical applications.

TTC zones in the vicinity of intersections might block movements and interfere with normal road user flows. Such conflicts frequently occur at more complex signalized intersections having such features as traffic signal heads over particular lanes, lanes allocated to specific movements, multiple signal phases, signal detectors for actuated control, and accessible pedestrian signals and detectors.

Guidance:

The effect of the work upon signal operation should be considered, such as signal phasing for ensuring adequate capacity, maintaining or adjusting signal detectors, and ensuring the appropriate visibility of signal heads.

**Standard:**

**When work will occur near an intersection where operational, capacity, or pedestrian accessibility problems are anticipated, the highway agency having jurisdiction shall be contacted.**

Guidance:

For work at an intersection, advance warning signs, devices, and markings should be used on all cross streets, as appropriate. The typical applications depict urban intersections on arterial streets. Where the posted speed limit, the off-peak 85th-percentile speed prior to the work starting, or the anticipated speed exceeds 60 km/h (40 mph), additional warning signs should be used in the advance warning area.

Pedestrian crossings near TTC sites should be separated from the worksite by appropriate barriers that maintain the accessibility and detectability for pedestrians with disabilities.

Support:

Near-side work spaces, as depicted in Figure 6H-21, are simply handled as a midblock lane closure. A problem that might occur with near-side lane closure is a reduction in capacity, which during certain hours of operation could result in congestion and backups.

Option:

When near-side work spaces are used, an exclusive turn lane may be used for through vehicular traffic.

Where space is restricted in advance of near-side work spaces, as with short block spacings, two warning signs may be used in the advance warning area, and a third action-type warning or a regulatory sign (such as Keep Left) may be placed within the transition area.

Support:

Far-side work spaces, as depicted in Figures 6H-22 through 6H-25, involve additional treatment because road users typically enter the activity area by straight-through and left- or right-turning movements.

Guidance:

When a lane through an intersection must be closed on the far side, it should also be closed on the near-side approach to preclude merging movements within the intersection.

Option:

If there are a significant number of vehicles turning from a near-side lane that is closed on the far side, the near-side lane may be converted to an exclusive turn lane.

Support:

Figures 6H-26 and 6H-27 provide guidance on applicable procedures for work performed within the intersection.

Option:

If the work is within the intersection, any of the following strategies may be used:

- A. A small work space so that road users can move around it, as shown in Figure 6H-26;
- B. Flaggers or uniformed law enforcement officers to direct road users, as shown in Figure 6H-27;
- C. Work in stages so the work space is kept to a minimum; and
- D. Road closures or upstream diversions to reduce road user volumes.

**Guidance:**

Depending on road user conditions, a flagger(s) and/or a uniformed law enforcement officer(s) should be used to control road users.

**Section 6G.14 Work Within the Traveled Way of Freeways and Expressways**

**Support:**

Problems of TTC might occur under the special conditions encountered where vehicular traffic must be moved through or around TTC zones on high-speed, high-volume roadways. Although the general principles outlined in the previous Sections of this Manual are applicable to all types of highways, high-speed, access-controlled highways need special attention in order to reasonably safely and efficiently accommodate vehicular traffic while also protecting work forces. The road user volumes, road vehicle mix (buses, trucks, cars, and bicycles, if permitted), and speed of vehicles on these facilities require that careful TTC procedures be implemented, for example, to induce critical merging maneuvers well in advance of work spaces and in a manner that creates minimum turbulence and delay in the vehicular traffic stream. These situations often require more conspicuous devices than specified for normal rural highway or urban street use. However, the same important basic considerations of uniformity and standardization of general principles apply for all roadways.

Work under high-speed, high-volume vehicular traffic on a controlled access highway is complicated by the roadway design and operational features. The presence of a median that establishes separate roadways for directional vehicular traffic flow might prohibit the closing of one of the roadways or the diverting of vehicular traffic to the other roadway. Lack of access to and from adjacent roadways prohibits rerouting of vehicular traffic away from the work space in many cases. Other conditions exist where work must be limited to night hours, thereby necessitating increased use of warning lights, illumination of work spaces, and advance warning systems.

TTC for a typical lane closure on a divided highway is shown in Figure 6H-33. Temporary traffic controls for short duration and mobile operations on freeways are shown in Figure 6H-35. A typical application for shifting vehicular traffic lanes around a work space is shown in Figure 6H-36. TTC for multiple and interior lane closures on a freeway is shown in Figures 6H-37 and 6H-38 Department of Transportation's Standard Plan T10. See Section 1A.11 for information regarding this publication.

**Guidance:**

~~The method for closing an interior lane when the open lanes have the capacity to carry vehicular traffic should be as shown in Figure 6H-37. When the capacity of the other lanes is needed, the method shown in Figure 6H-38 should be used.~~

**Support:**

The temporary traffic controls for short duration and mobile operations on State highways are shown in Department of Transportation's Standard Plans T15, T16 and T17.

A typical layout of closing lanes to direct traffic around a workspace is shown in Department of Transportation's Standard Plan T10.

See Section 1A.11 for information regarding this publication.

**Section 6G.15 Two-Lane, Two-Way Traffic on One Roadway of a Normally Divided Highway**

**Support:**

Two-lane, two-way operation on one roadway of a normally divided highway is a typical procedure that requires special consideration in the planning, design, and work phases, because unique operational problems (for example, increasing the risk of head-on crashes) can arise with the two-lane, two-way operation.

**Standard:**

**When two-lane, two-way traffic control must be maintained on one roadway of a normally divided highway, opposing vehicular traffic shall be separated with either temporary traffic barriers (concrete safety-shape or approved alternate) or with channelizing devices throughout the length of the two-way operation. The use of markings and complementary signing, by themselves, shall not be used.**

**Support:**

Figure 6H-39 shows the procedure for two-lane, two-way operation. Treatments for entrance and exit ramps within the two-way roadway segment of this type of work are shown in Figures 6H-40 and 6H-41.

**Support:**

Treatments for entrance and exit ramps within the two-way roadway segment of this type of work are shown in Department of Transportation's Standard Plans T10 and T14. See Section 1A.11 for information regarding this publication.

**Section 6G.16 Crossovers**

**Guidance:**

The following are considered good guiding principles for the design of crossovers:

- A. Tapers for lane drops should be separated from the crossovers, as shown in Figure 6H-39.
- B. Crossovers should be designed for speeds no lower than 16 km/h (10 mph) below the posted speed, the off-peak 85th-percentile speed prior to the work starting, or the anticipated operating speed of the roadway, unless unusual site conditions require that a lower design speed be used.
- C. A good array of channelizing devices, delineators, and full-length, properly placed pavement markings should be used to provide drivers with a clearly defined travel path.
- D. The design of the crossover should accommodate all vehicular traffic, including trucks and buses.

**Support:**

Temporary traffic barriers and the excessive use of TTC devices cannot compensate for poor geometric and roadway cross-section design of crossovers.

**Section 6G.17 Interchanges**

**Guidance:**

Access to interchange ramps on limited-access highways should be maintained even if the work space is in the lane adjacent to the ramps. Access to exit ramps should be clearly marked and delineated with channelizing devices. For long-term projects, conflicting pavement markings should be removed and new ones placed. Early coordination with officials having jurisdiction over the affected cross streets and providing emergency services should occur before ramp closings.

**Option:**

If access is not possible, ramps may be closed by using signs and Type III barricades. As the work space changes, the access area may be changed, as shown in Figure 6H-42. A TTC zone in the exit ramp may be handled as shown in Figure 6H-43.

When a work space interferes with an entrance ramp, a lane may need to be closed on the freeway (see Figure 6H-44). A TTC zone in the entrance ramp may require shifting ramp vehicular traffic (see Figure 6H-44).

**Option:**

A temporary traffic control zone in the entrance and exit ramps may be handled as shown in Department of Transportation's Standard Plans T10 and T14. See Section 1A.11 for information regarding this publication.

**Section 6G.18 Movable Barriers**

**Support:**

Figure 6H-45 shows a temporary reversible lane using movable barriers.

**Option:**

If the work activity in Figure 6H-34 permits, a movable barrier may be used and relocated to the shoulder during nonwork periods or peak-period vehicular traffic conditions.

**Section 6G.19 Work in the Vicinity of Highway-Rail Grade Crossings**

**Standard:**

**When highway-rail grade crossings exist either within or in the vicinity of a TTC zone, lane restrictions, flagging, or other operations shall not create conditions where vehicles can be queued across the railroad tracks. If the queuing of vehicles across the tracks cannot be avoided, a uniformed**

**law enforcement officer or flagger shall be provided at the crossing to prevent vehicles from stopping on the tracks, even if automatic warning devices are in place.**

Support:

Figure 6H-46 shows work in the vicinity of a highway-rail grade crossing.

Guidance:

Early coordination with the railroad company should occur before work starts.

**Section 6G.20 Temporary Traffic Control During Nighttime Hours**

**Standard:**

Highway construction work lighting shall be as per Construction Safety Order 1523 (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.

Support:

Chapter 6D and Sections 6F.68 and 6G.05 contain additional information regarding the steps to follow when pedestrian or bicycle facilities are affected by the worksite.

Conducting highway construction and maintenance activities during night hours could provide an advantage when traditional daytime traffic control strategies cannot achieve an acceptable balance between worker and public safety, traffic and community impact, and constructability. The two basic advantages of working at night are reduced traffic congestion and less involvement with business activities. However, the two basic conditions that must normally be met for night work to offer any advantage are reduced traffic volumes and easy set up and removal of the traffic control patterns on a nightly basis.

Shifting work activities to night hours, when traffic volumes are lower and normal business is less active, might offer an advantage in some cases, as long as the necessary work can be completed and the work site restored to essentially normal operating conditions to carry the higher traffic volume during non-construction hours.

Although working at night might offer advantages, it also includes safety issues. Reduced visibility inherent in night work impacts the performance of both drivers and workers. Because traffic volumes are lower and congestion is minimized, speeds are often higher at night necessitating greater visibility at a time when visibility is reduced. Finally, the incidence of impaired (alcohol or drugs), fatigued, or drowsy drivers might be higher at night.

Working at night also involves other factors, including construction productivity and quality, social impacts, economics, and environmental issues. A decision to perform construction or maintenance activities at night normally involves some consideration of the advantages to be gained compared to the safety and other issues that might be impacted.

Guidance:

Considering the safety issues inherent to night work, consideration should be given to enhancing traffic controls (see Section 6G.04) to provide added visibility and driver guidance, and increased protection for workers.

In addition to the enhancements listed in Section 6G.04, consideration should be given to providing additional lights and retroreflective markings to workers, work vehicles, and equipment.

Option:

Where reduced traffic volumes at night make it feasible, the entire roadway may be closed by detouring traffic to alternate facilities, thus removing the traffic risk from the activity area.

Guidance:

Because typical street and highway lighting is rarely adequate to provide sufficient levels of illumination for work tasks, temporary lighting should be provided where workers are active to supply sufficient illumination to reasonably safely perform the work tasks.

Temporary lighting for night work should be designed such that glare does not interfere with driver visibility, or create visibility problems for truck drivers, equipment operators, flaggers, or other workers.

Consideration should also be given to stationing uniformed law enforcement officers and lighted patrol cars at night work locations where there is a concern that high speeds or impaired drivers might result in undue risks for workers or other drivers.

**Standard:**

**Except in emergencies, temporary lighting shall be provided at all flagger stations.**

Support:

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

Desired illumination levels vary depending upon the nature of the task involved. An average horizontal luminance of 50 lux (5 foot candles) can be adequate for general activities. An average horizontal luminance of 108 lux (10 foot candles) can be adequate for activities around equipment. Tasks requiring high levels of precision and extreme care can require an average horizontal luminance of 216 lux (20 foot candles).

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## CHAPTER 6H. TYPICAL APPLICATIONS

### Section 6H.01 Typical Applications

Support:

Whenever the acronym "TTC" is used in this Chapter, it refers to "temporary traffic control".

**Standard:**

**The needs and control of all road users (motorists, bicyclists, and pedestrians within the highway, including persons with disabilities in accordance with the Americans with Disabilities Act of 1990 (ADA), Title II, Paragraph 35.130) through a TTC zone shall be an essential part of highway construction, utility work, maintenance operations, and the management of traffic incidents.**

Support:

Chapter 6G contains discussions of typical TTC activities. Chapter 6H 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.

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. Examples are presented in this Chapter showing how to apply principles and standards. Applying these guidelines to actual situations and adjusting to field conditions requires judgment. In general, the procedures illustrated represent minimum solutions for the situations depicted.

Option:

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:

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.

Table 6H-1 is an index of the 46 typical applications. Typical applications are shown on the right 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.

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

**Guidance:**

The spacing of channelizing devices should not exceed the maximum distances shown in Table 6F-102(CA).

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**Table 6H-1. Index to Typical Applications (Sheet 1 of 2)**

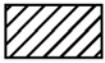
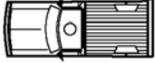
Typical Application Description	Typical Application Number
Work Outside of Shoulder (see Section 6G.06)	
Work Beyond the Shoulder	TA-1
Blasting Zone	TA-2
Work on the Shoulder (see Sections 6G.07 and 6G.08)	
Work on Shoulders	TA-3
Short Duration or Mobile Operation on Shoulder	TA-4
Shoulder Closure on Freeway	TA-5
Shoulder Work with Minor Encroachment	TA-6
Work Within the Traveled Way of Two-Lane Highways (see Section 6G.10)	
Road Closed with Diversion	TA-7
Roads Closed with Off-Site Detour	TA-8
Overlapping Routes with Detour	TA-9
Lane Closure on Two-Lane Road Using Flaggers	TA-10
Lane Closure on Two-Lane Road with Low Traffic Volumes	TA-11
Lane Closure on Two-Lane Road Using Traffic Control Signals	TA-12
Temporary Road Closure	TA-13
Haul Road Crossing	TA-14
Work in Center of Road with Low Traffic Volumes	TA-15
Surveying Along Centerline of Road with Low Traffic Volumes	TA-16
Mobile Operations on Two-Lane Road	TA-17
Work Within the Traveled Way of Urban Streets (see Section 6G.11)	
Lane Closure on Minor Street	TA-18
Detour for One Travel Direction	TA-19
Detour for Closed Street	TA-20
Work Within the Traveled Way at an Intersection and Sidewalks (see Section 6G.13)	
Lane Closure on Near Side of Intersection	TA-21
Right Lane Closure on Far Side of Intersection	TA-22
Left Lane Closure on Far Side of Intersection	TA-23
Half Road Closure on Far Side of Intersection	TA-24
Multiple Lane Closures at Intersection	TA-25
Closure in Center of Intersection	TA-26
Closure at Side of Intersection	TA-27
Sidewalk Closures and Bypass Sidewalks	TA-28
Crosswalk Closures and Pedestrian Detours	TA-29

**Table 6H-1. Index to Typical Applications (Sheet 2 of 2)**

Typical Application Description	Typical Application Number
Work Within the Traveled Way of Multi-lane, Nonaccess Controlled Highways (see Section 6G.12)	
Interior Lane Closure on Multi-lane Street	TA-30
Lane Closure on Street with Uneven Directional Volumes	TA-31
Half Road Closure on Multi-lane, High-Speed Highway	TA-32
Lane Closure on Divided Highway	TA-33
Lane Closure with Temporary Traffic Barrier	TA-34
Mobile Operation on Multi-lane Road	TA-35
Work Within the Traveled Way of Expressways and Freeways (see Section 6G.14)	
Lane Shift on Freeway	TA-36
Double Lane Closure on Freeway	TA-37
Interior Lane Closure on Freeway	TA-38
Median Crossover on Freeway	TA-39
Median Crossover for Entrance Ramp	TA-40
Median Crossover for Exit Ramp	TA-41
Work in Vicinity of Exit Ramp	TA-42
Partial Exit Ramp Closure	TA-43
Work in Vicinity of Entrance Ramp	TA-44
Temporary Reversible Lane Using Movable Barriers	TA-45
Work in the Vicinity of Highway-Rail Grade Crossings (see Section 6G.19)	
Work in Vicinity of Highway-Rail Grade Crossing	TA-46

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**Table 6H-2. Meaning of Symbols on Typical Application Diagrams**

	Arrow panel
	Arrow panel support or trailer (shown facing down)
	Changeable message sign or support trailer
	Channelizing device
	Crash Cushion
	Direction of temporary traffic detour
	Direction of traffic
	Flagger
	High level warning device (Flag tree)
	Luminaire
	Pavement markings that should be removed for a long term project
	Sign (shown facing left)
	Surveyor
	Temporary barrier
	Temporary barrier with warning lights
	Traffic or Pedestrian signal
	Truck mounted attenuator
	Type III Barricade
	Warning lights
	Work space
	Work vehicle

**Table 6H-3. Meaning of Letter Codes on Typical Application Diagrams**

Road Type	Distance Between Signs**		
	A	B	C
Urban (low speed)*	30 (100)	30 (100)	30 (100)
Urban (high speed)*	100 (350)	100 (350)	100 (350)
Rural	150 (500)	150 (500)	150 (500)
Expressway / Freeway	300 (1,000)	450 (1,500)	800 (2,640)

\* Speed category to be determined by highway agency

\*\* Distances are shown in meters (feet). 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 third sign is the first one in a three-sign series encountered by a driver approaching a TTC zone.)

**Table 6H-4. Formulas for Determining Taper Lengths**

Speed Limit (S)	Taper Length (L) Meters	Speed Limit (S)	Taper Length (L) Feet
60 km/h or less	$L = \frac{WS^2}{155}$	40 mph or less	$L = \frac{WS^2}{60}$
70 km/h or more	$L = \frac{WS}{1.6}$	45 mph or more	$L = WS$

Where: L = taper length in meters (feet)

W = width of offset in meters (feet)

S = posted speed limit, or off-peak 85th-percentile speed prior to work starting, or the anticipated operating speed in km/h (mph)

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## Notes for Figure ~~6H-1~~ 6H-1(CA)—Typical Application 1

### Work Beyond the Shoulder

**Guidance:**

1. If the work space is in the median of a divided highway, an advance warning sign should also be placed on the left side of the directional roadway.

**Option:**

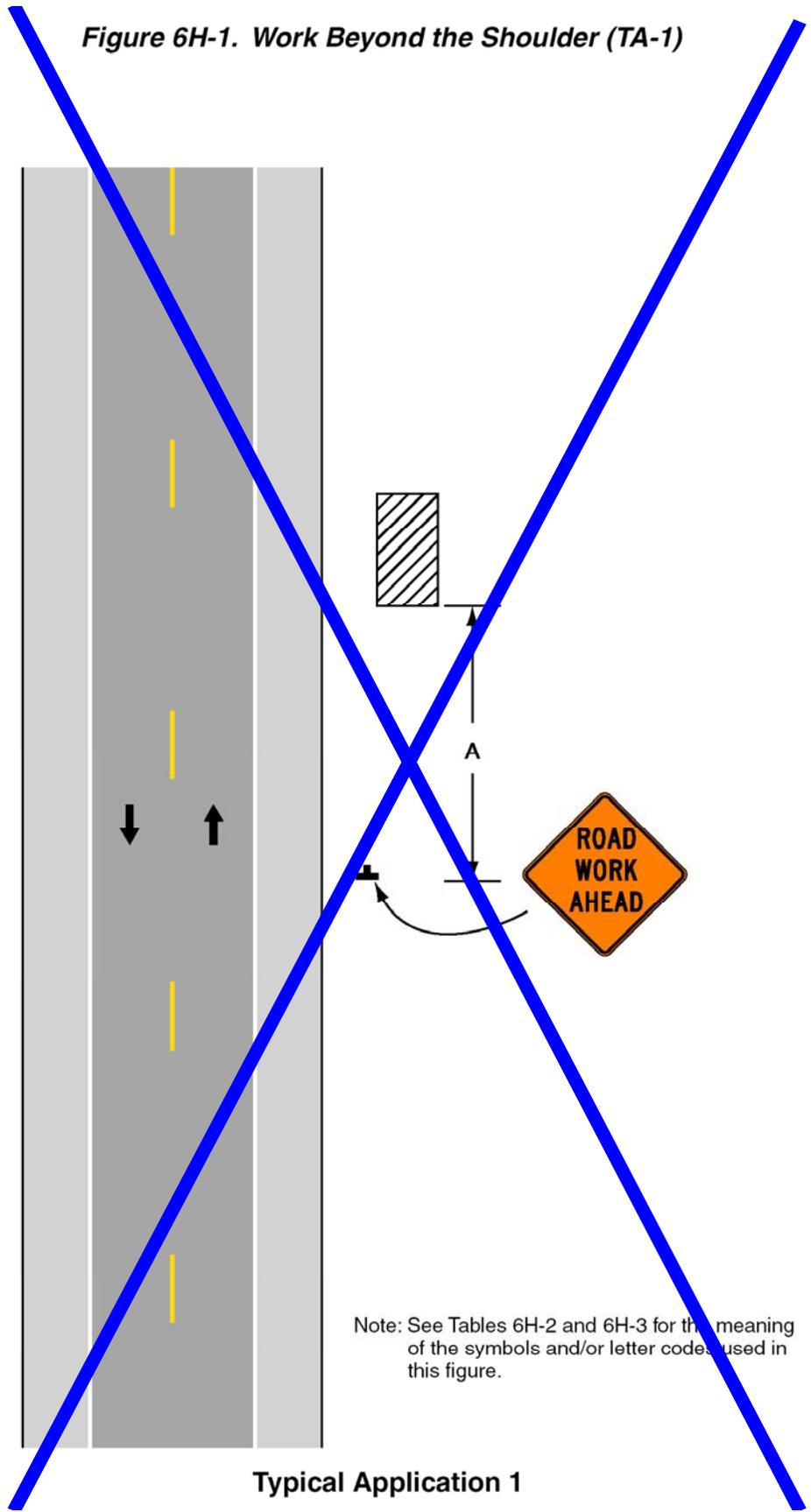
2. The ~~ROAD WORK AHEAD sign~~ Workers (W21-1a) sign may be replaced with other appropriate signs such as the SHOULDER WORK sign. The SHOULDER WORK sign may be used for work adjacent to the shoulder.
3. The ~~ROAD WORK AHEAD sign~~ Workers (W21-1a) sign may be omitted where the work space is behind a barrier, more than 600 mm (24 in) behind the curb, or 4.6 m (15 ft) or more from the edge of any roadway.
4. For short-term, short-duration or mobile operation, all signs and channelizing devices may be eliminated if a vehicle with activated high-intensity rotating, flashing, oscillating, or strobe lights is used.
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.**
- 

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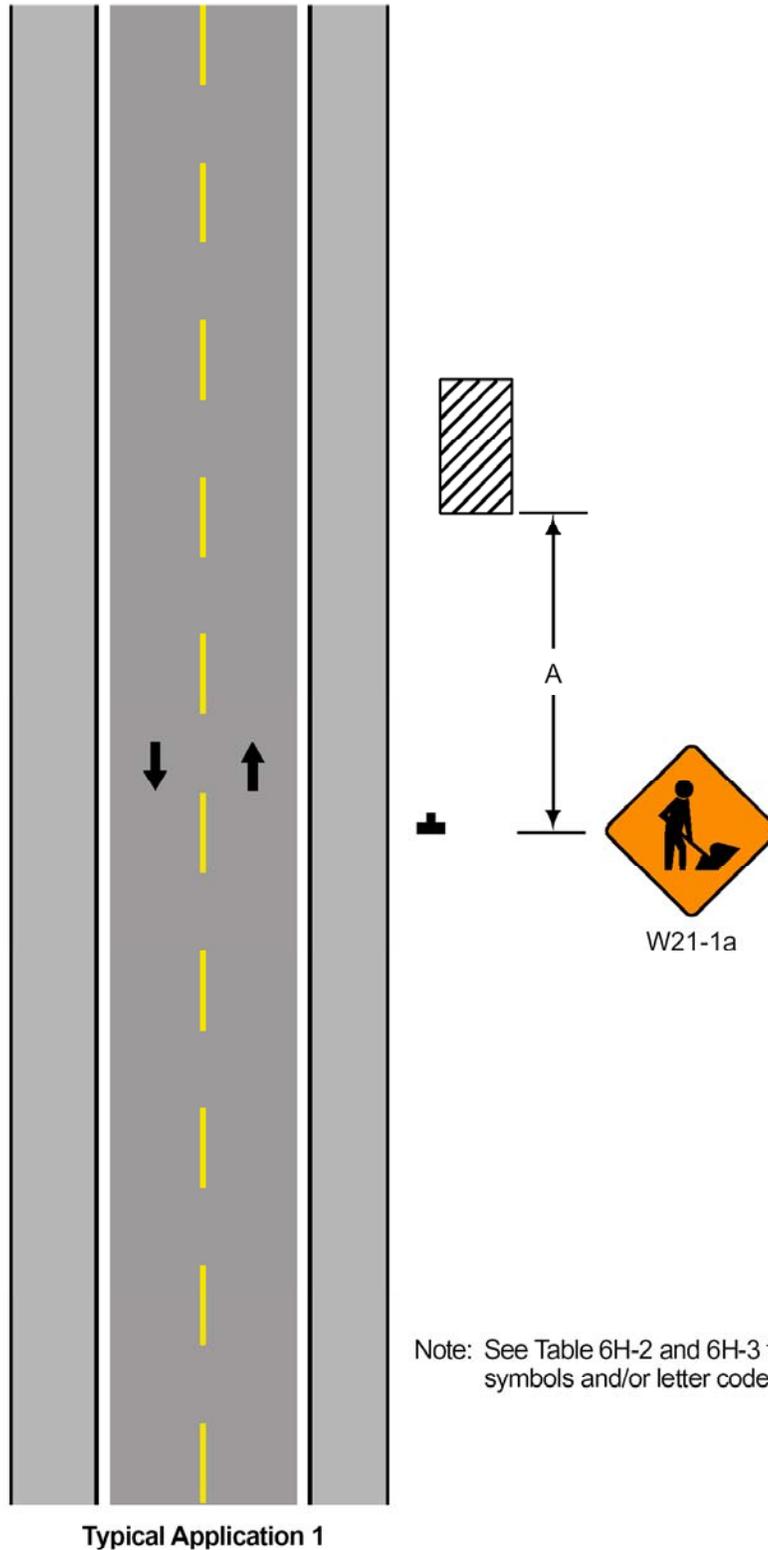
**Figure 6H-1. Work Beyond the Shoulder (TA-1)**



Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

**Typical Application 1**

**Figure 6H-1 (CA). Work Beyond the Shoulder (TA-1)**



Note: See Table 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

## Notes for Figure 6H-2—Typical Application 2

### Blasting Zone

**Standard:**

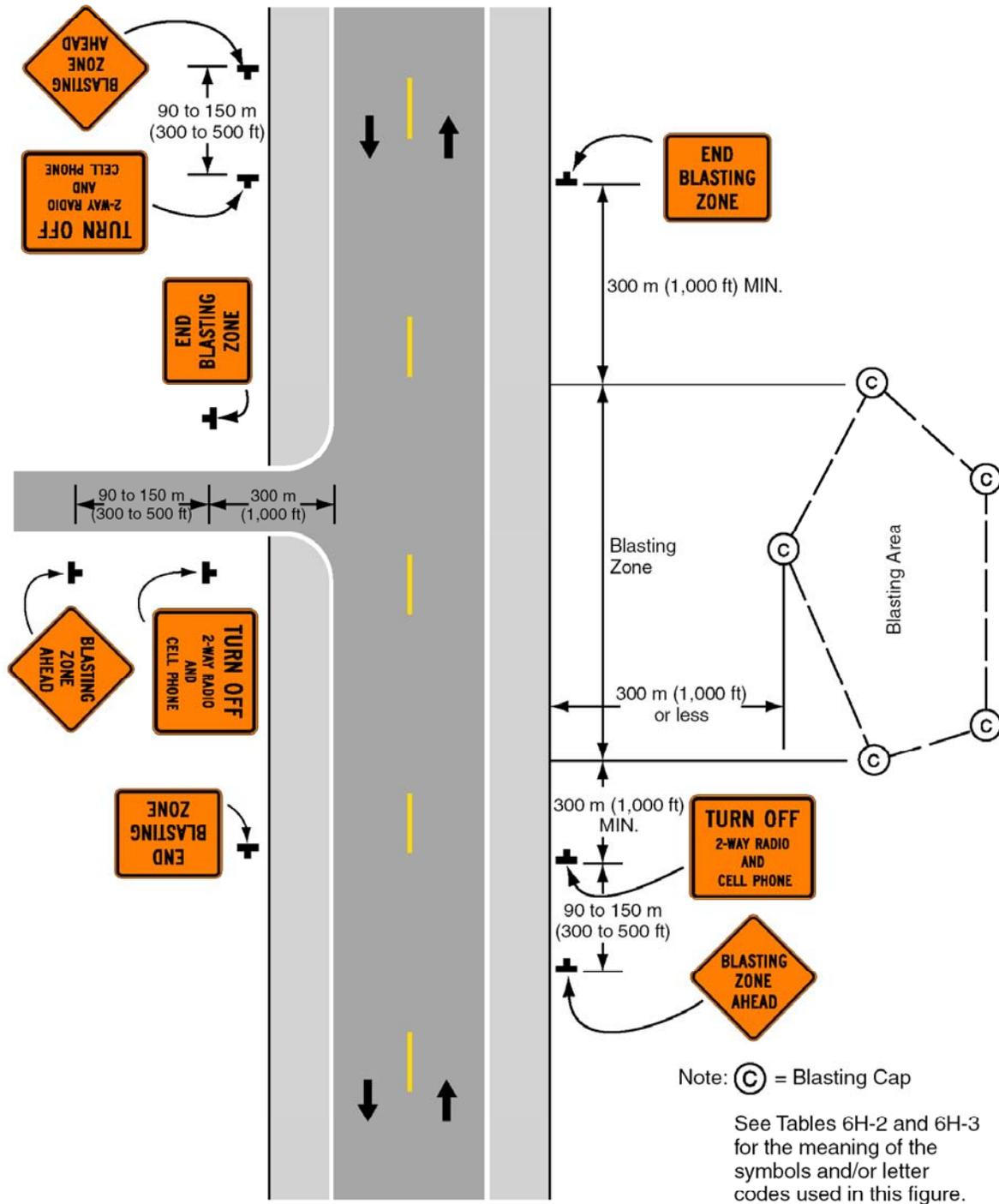
- 1. Whenever blasting caps are used within 300 m (1,000 ft) of a roadway, the signing shown shall be used.**
- 2. The signs shall be covered or removed when there are no explosives in the area or the area is otherwise secure.**
- 3. Whenever a side road intersects the roadway between the BLASTING ZONE AHEAD sign and the END BLASTING ZONE sign, or a side road is within 300 m (1,000 ft) of any blasting cap, similar signing, as on the mainline, shall be installed on the side road.**
- 4. Prior to blasting, the blaster in charge shall determine whether road users in the blasting zone will be endangered by the blasting operation. If there is danger, road users shall not be permitted to pass through the blasting zone during blasting operations.**

**Guidance:**

- 5. On a divided highway, the signs should be mounted on both sides of the directional roadways.**
- 

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**Figure 6H-2. Blasting Zone (TA-2)**



**Typical Application 2**

### Notes for Figure 6H-3—Typical Application 3

#### Work on Shoulders

**Guidance:**

1. A SHOULDER WORK sign should be placed on the left side of the roadway for a divided or one-way street only if the left shoulder is affected.

**Option:**

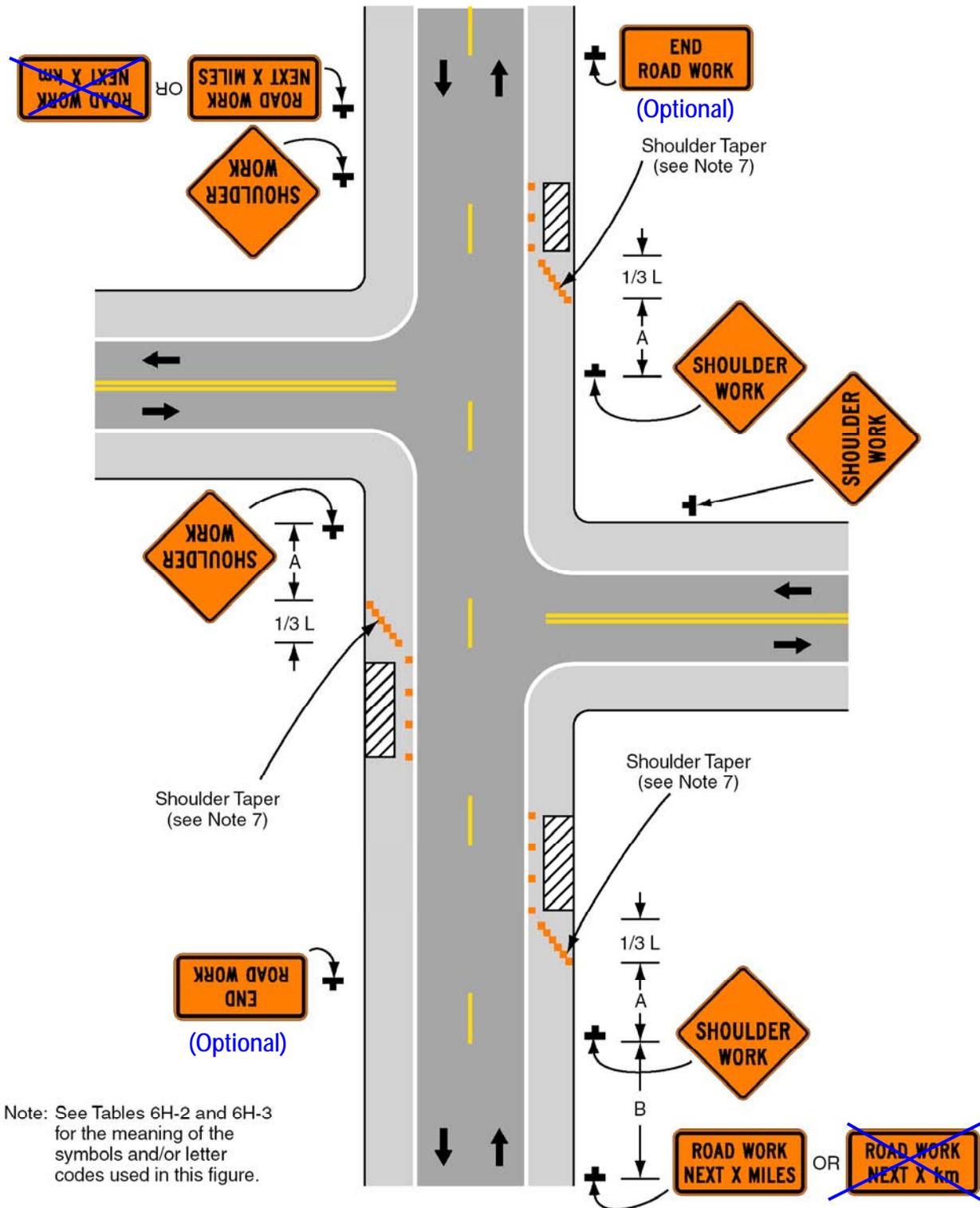
2. The Workers symbol signs may be used instead of SHOULDER WORK signs.
3. The SHOULDER WORK AHEAD sign on an intersecting roadway may be omitted where drivers emerging from that roadway will encounter another advance warning sign prior to this activity area.
4. For short-duration operations of 60 minutes or less, all signs and channelizing devices may be eliminated if a vehicle with activated high-intensity rotating, flashing, oscillating, or strobe lights is used.
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. **When paved shoulders having a width of 2.4 m (8 ft) or more are closed, at least one advance warning sign shall be used. In addition, channelizing devices shall be used to close the shoulder in advance to delineate the beginning of the work space and direct vehicular traffic to remain within the traveled way.**
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**Figure 6H-3. Work on Shoulders (TA-3)**



**Typical Application 3**

## Notes for Figure ~~6H-4~~ 6H-4(CA)—Typical Application 4

### Short-Duration or Mobile Operation on 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 8 km (5 mi).
2. In those situations where the distance between the advance signs and the work is 3.2 km (2 mi) to 8 km (5 mi), a Supplemental Distance plaque should be used with the ~~ROAD WORK AHEAD~~ SHOULDER WORK (W21-5) sign.

#### Option:

3. ~~The ROAD WORK NEXT XX km (MILES) sign may be used instead of the ROAD WORK AHEAD sign~~ The Next Distance (W7-3a) plaque may be used with the SHOULDER WORK (W21-5) sign if the work locations occur over a distance of more than 3.2 km (2 mi).
4. Warning signs may be omitted when the work vehicle displays high-intensity rotating, flashing, oscillating, or strobe lights if the distance between work locations is 1.6 km (1 mile) or more, and if the work vehicle travels at vehicular traffic speeds between locations.
5. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing, oscillating, or strobe lights.

#### Standard:

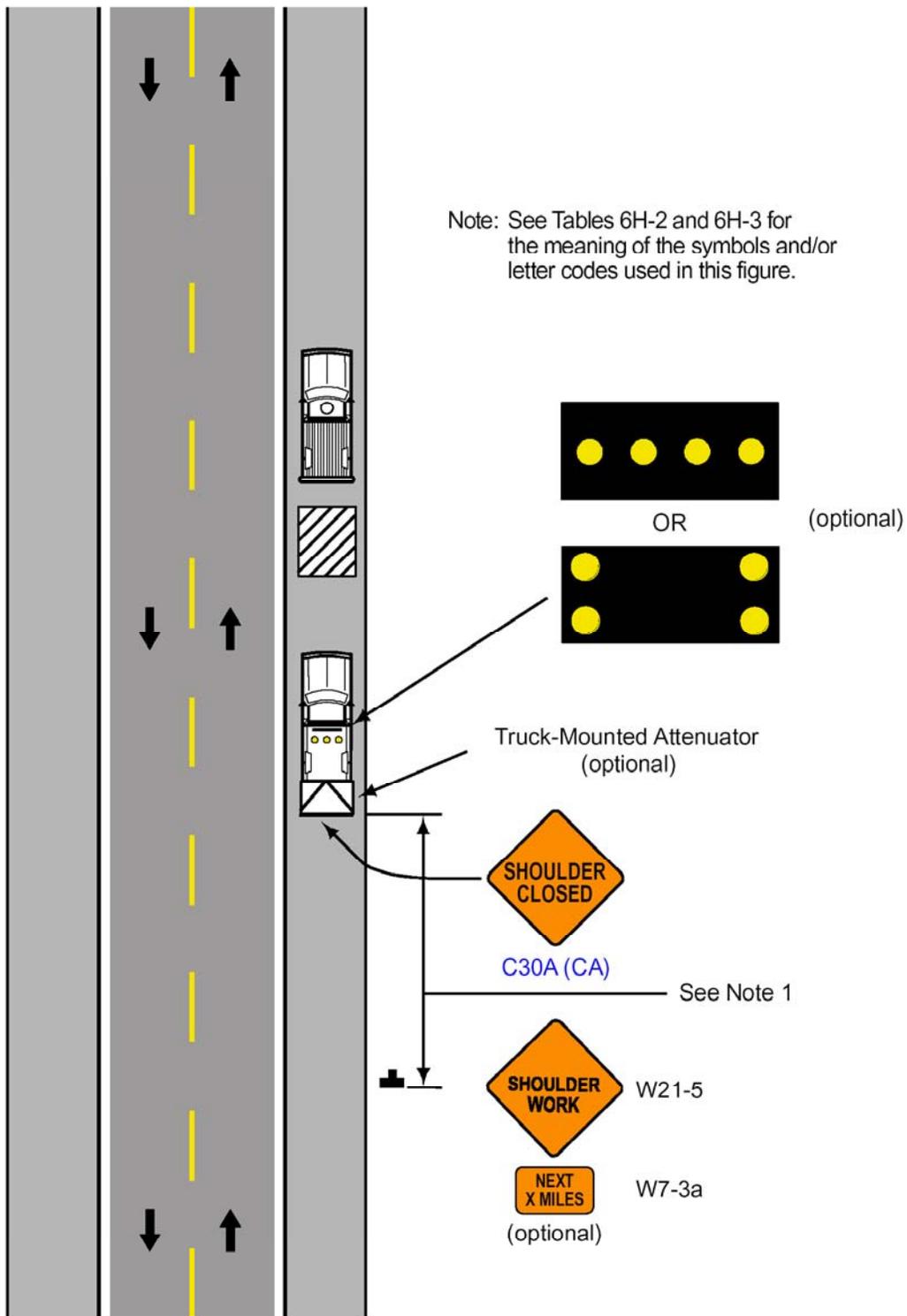
6. **Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights.**
7. **If an arrow panel is used for an operation on the shoulder, the caution mode shall be used.**

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



**Typical Application 4**

**Notes for Figure ~~6H-5~~ 6H-5(CA)—Typical Application 5**

**Shoulder Closure on Freeway**

**Guidance:**

1. SHOULDER CLOSED signs should be used on limited-access highways where there is no opportunity for disabled vehicles to pull off the roadway.
2. If drivers cannot see a pull-off area beyond the closed shoulder, information regarding the length of the shoulder closure should be provided in ~~meters or kilometers~~ (feet or miles), as appropriate.
3. The use of a temporary traffic barrier should be based on engineering judgment.

**Standard:**

- 4. Where temporary traffic barriers are installed, the ends of the barrier shall be treated in accordance with the provisions of Section 6F.81.**

**Option:**

5. The barrier shown in this typical application is an example of one method that may be used to close a shoulder of a long-term project.
6. The warning lights shown on the barrier may be used.

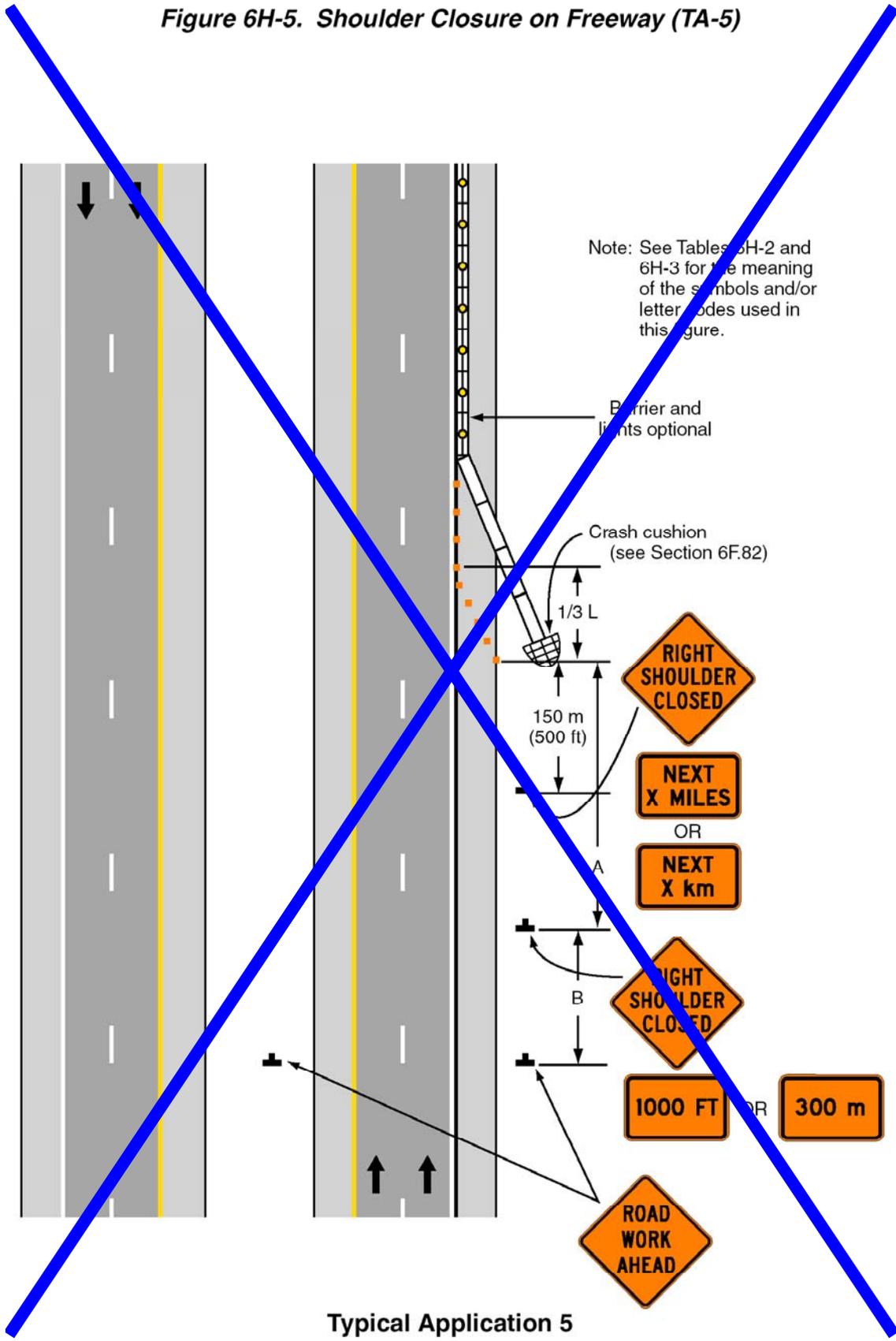
**Standard:**

- 7. The minimum offset from the upstream end of the barrier to the edge of the traveled way shall be at least 4.6 m (15 ft) unless shielded by a crash cushion.**

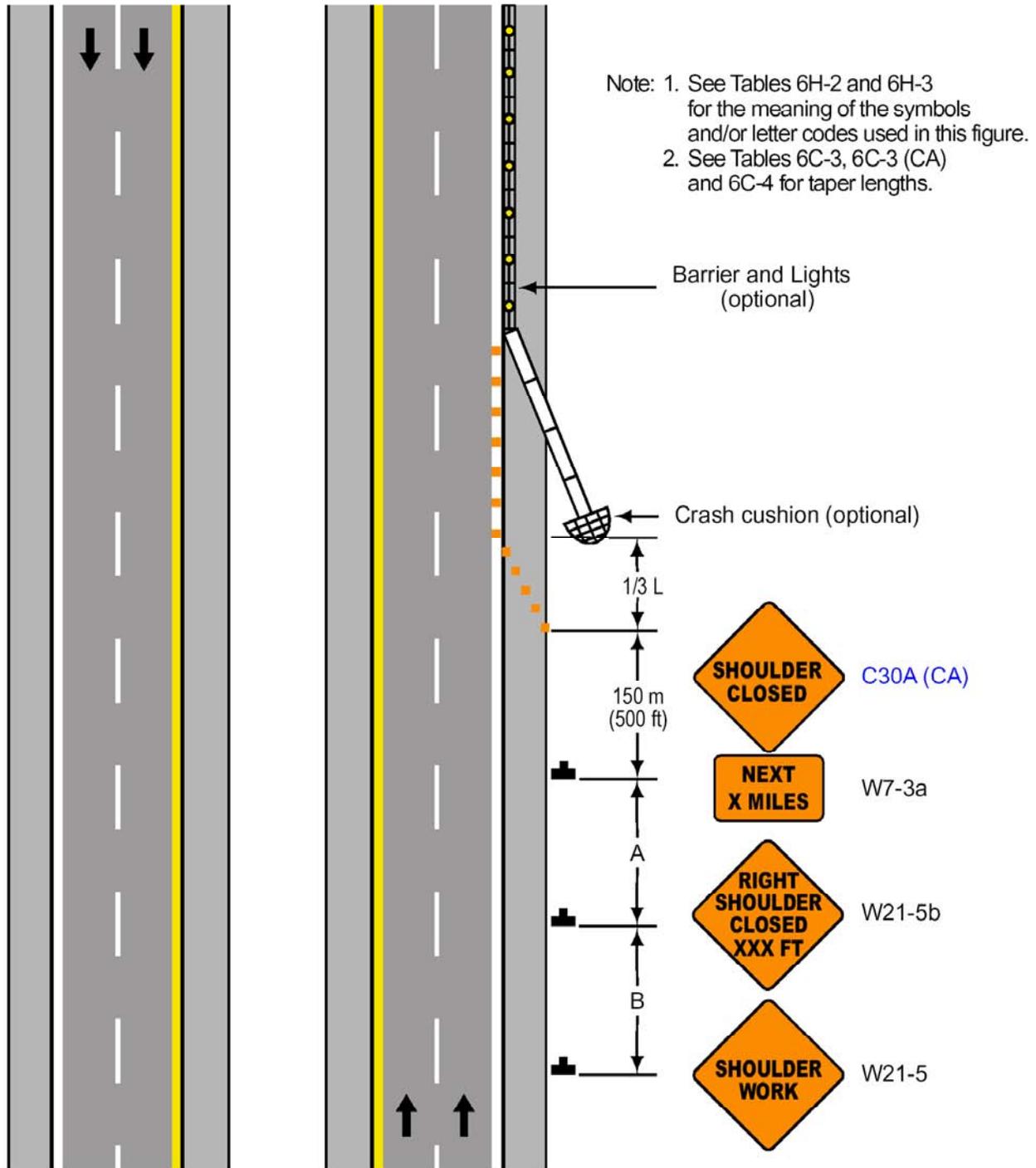
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**Figure 6H-5. Shoulder Closure on Freeway (TA-5)**



**Figure 6H-5 (CA). Shoulder Closure on Freeway (TA-5)**



**Typical Application 5**

## Notes for Figure 6H-6—Typical Application 6

### Shoulder Work with Minor Encroachment

**Guidance:**

1. All lanes should be a minimum of 3 m (10 ft) in width as measured to the near face of the channelizing devices.
2. The treatment shown should be used on a minor road having low speeds. For higher-speed traffic conditions, a lane closure should be used.

**Option:**

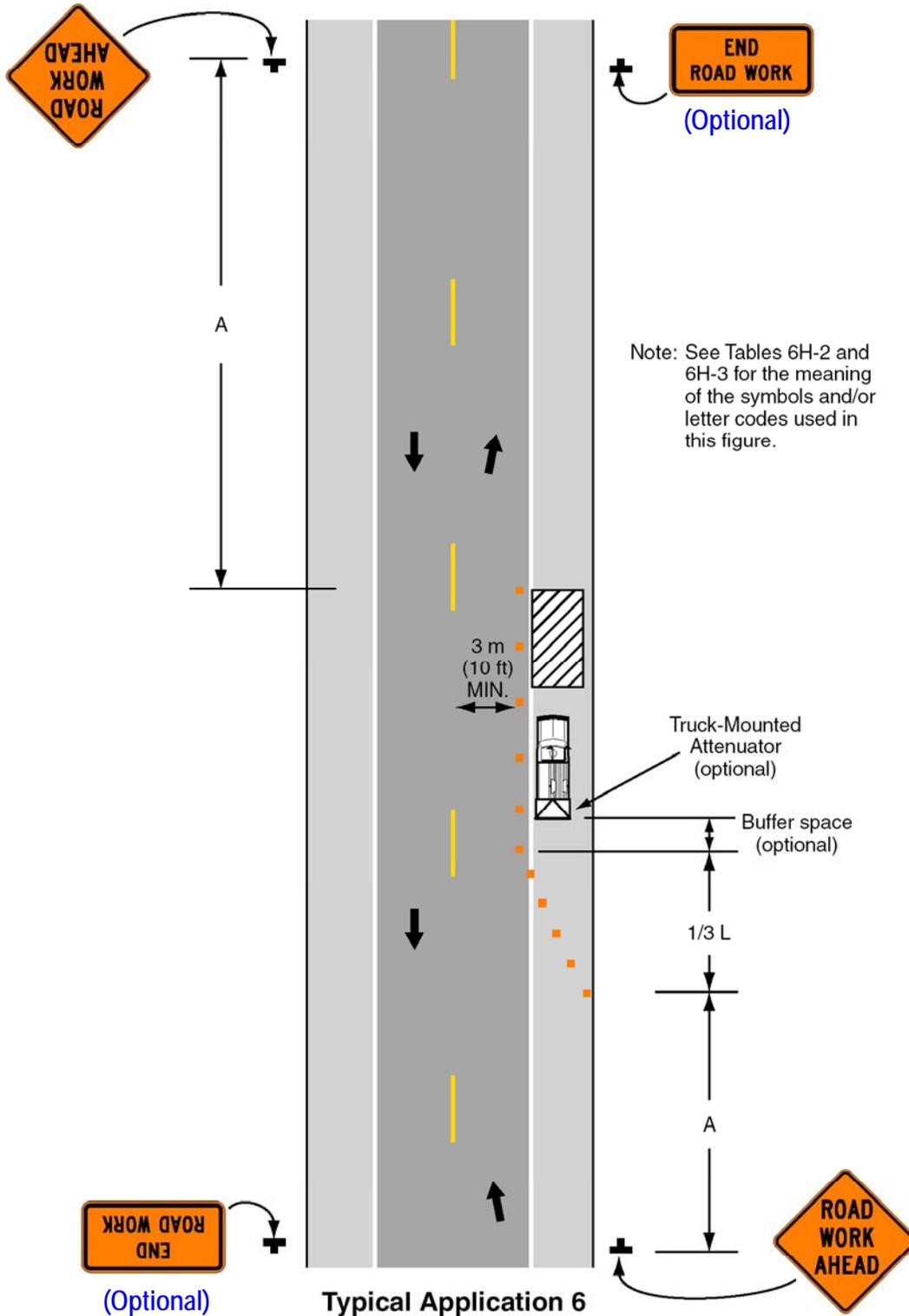
3. For short-term use on low-volume, low-speed roadways with vehicular traffic that does not include longer and wider heavy commercial vehicles, a minimum lane width of 2.7 m (9 ft) may be used.
4. Where the opposite shoulder is suitable for carrying vehicular traffic and of adequate width, lanes may be shifted by use of closely spaced channelizing devices, provided that the minimum lane width of 3 m (10 ft) is maintained.
5. Additional advance warning may be appropriate, such as a ROAD NARROWS sign.
6. Temporary traffic barriers may be used along the work space.
7. The shadow vehicle may be omitted if a taper and channelizing devices are used.
8. A truck-mounted attenuator may be used on the shadow vehicle.
9. For short-duration work, the taper and channelizing devices may be omitted if a shadow vehicle with activated high-intensity rotating, flashing, oscillating, or strobe lights is used.
10. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing, oscillating, or strobe lights.

**Standard:**

11. **Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights.**
  12. **Note 3 shall not be applicable to State highways. Note 1 shall be used instead for State highways.**
- 

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**Figure 6H-6. Shoulder Work with Minor Encroachment (TA-6)**



## Notes for Figure ~~6H-7~~ 6H-7(CA)—Typical Application 7

### Road Closure with Diversion

Support:

1. Signs and object markers are shown for one direction of travel only.

**Standard:**

2. **Devices similar to those depicted shall be placed for the opposite direction of travel.**
3. **Pavement markings no longer applicable shall be removed or obliterated as soon as practicable.**
4. **Temporary barriers and end treatments shall be crashworthy.**

Guidance:

5. If the tangent distance along the temporary diversion is more than 180 m (600 ft), a Reverse Curve sign, left first, should be used instead of the Double Reverse Curve sign, and a second Reverse Curve sign, right first, should be placed in advance of the second reverse curve back to the original alignment.
6. When the tangent section of the diversion is more than 180 m (600 ft), and the diversion has sharp curves with recommended speeds of 50 km/h (30 mph) or less, Reverse Turn signs should be used.
7. Where the temporary pavement and old pavement are different colors, the temporary pavement should start on the tangent of the existing pavement and end on the tangent of the existing pavement.

Option:

8. Flashing warning lights and/or flags may be used to call attention to the warning signs.
9. On sharp curves, large arrow signs may be used in addition to other advance warning signs.
10. Delineators or channelizing devices may be used along the diversion.
11. If the tangent distance along the temporary diversion is less than 180 m (600 ft), additional One-Direction Large Arrow (W1-6) and Chevron Alignment (W1-8) signs may be used.
12. When recommended speeds are the same for each curve, one Double Reverse Curve (W24-1) sign may be used, instead of two Reverse Curve (W1-4) signs, in advance of the first curve.

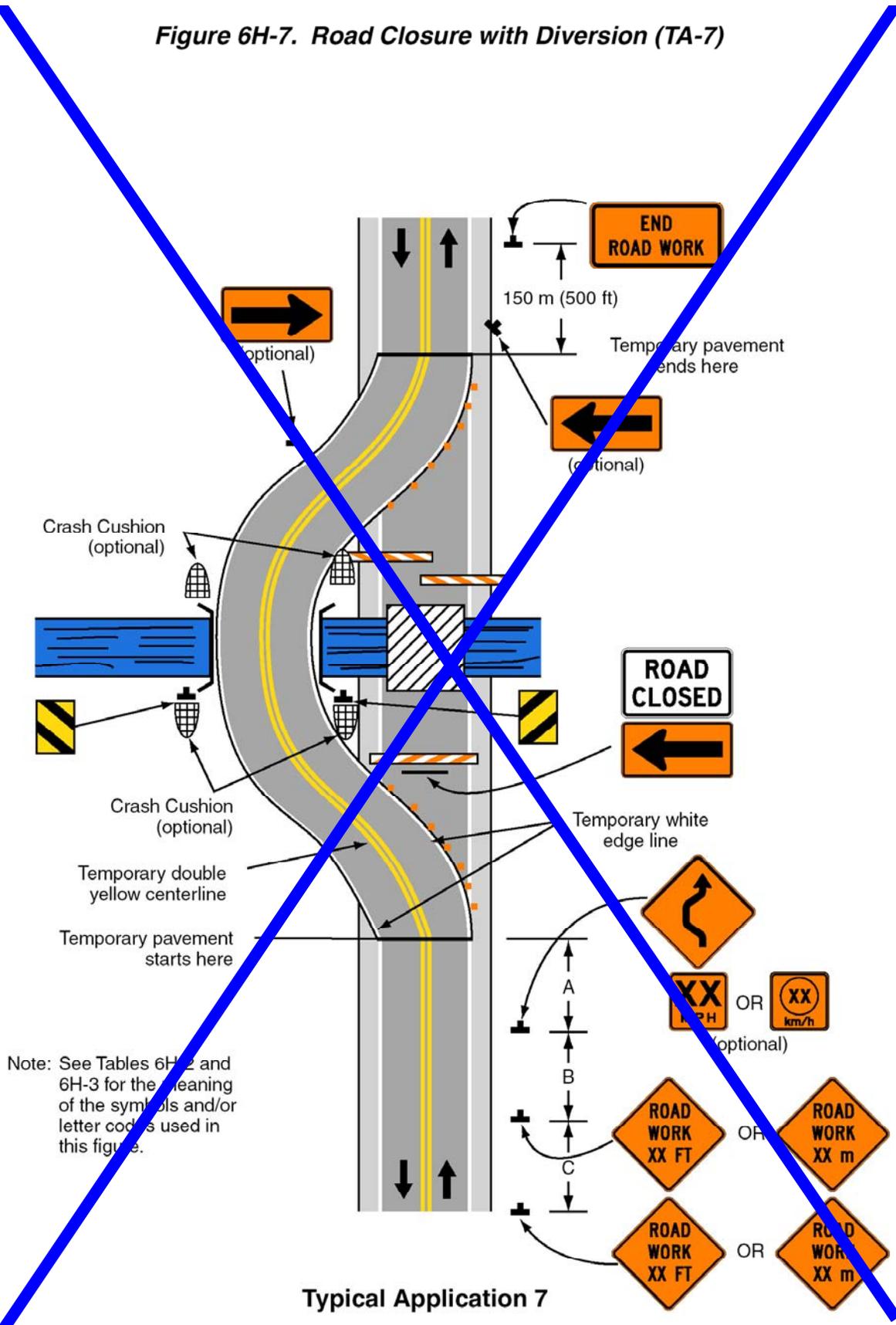
Support:

13. Use crash cushions, wherever applicable.

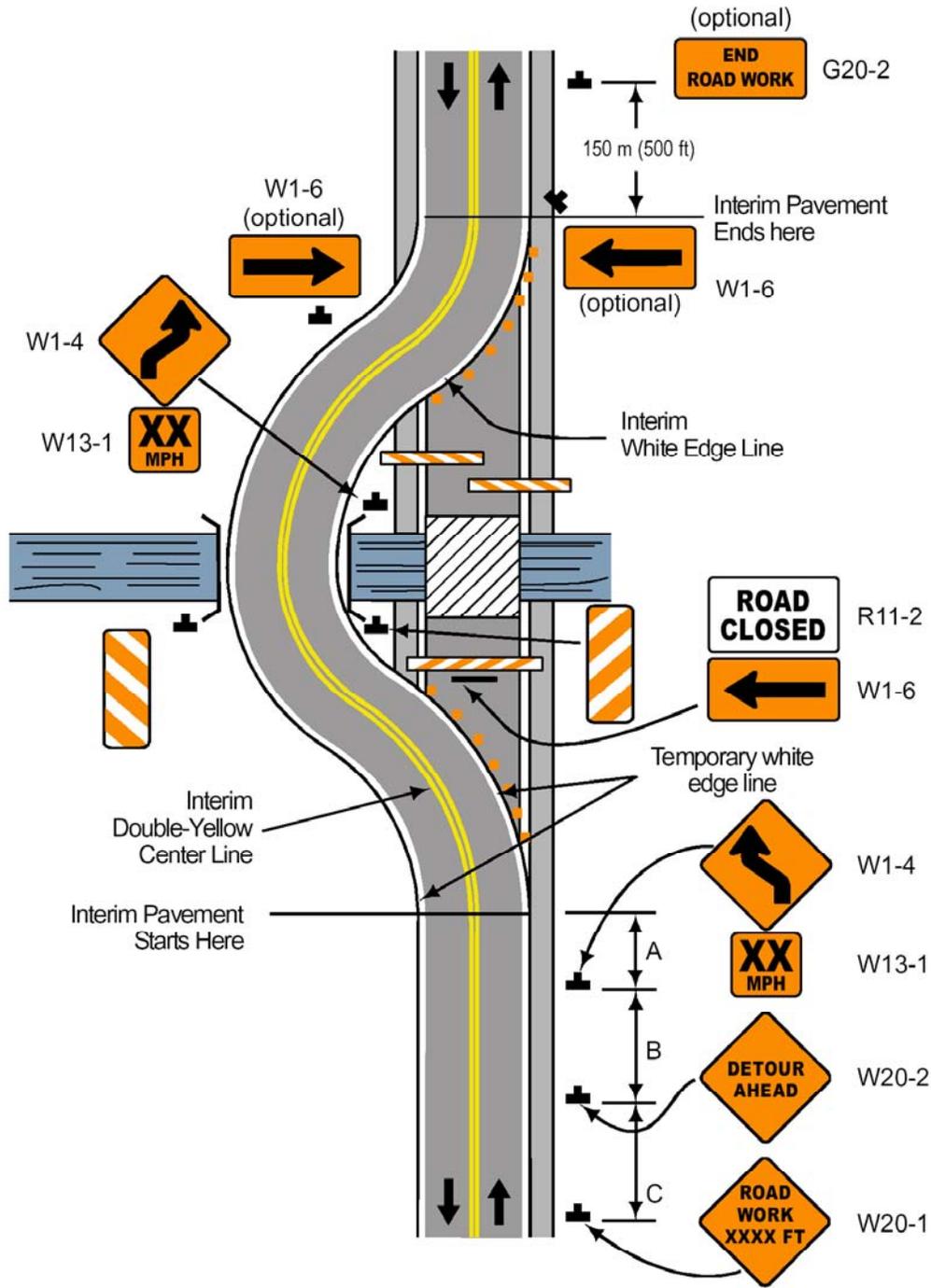
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**Figure 6H-7. Road Closure with Diversion (TA-7)**



**Figure 6H-7 (CA). Road Closure with Diversion (TA-7)**



**Typical Application 7**

Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

## Notes for Figure 6H-8—Typical Application 8

### Road Closure with Off-Site Detour

Guidance:

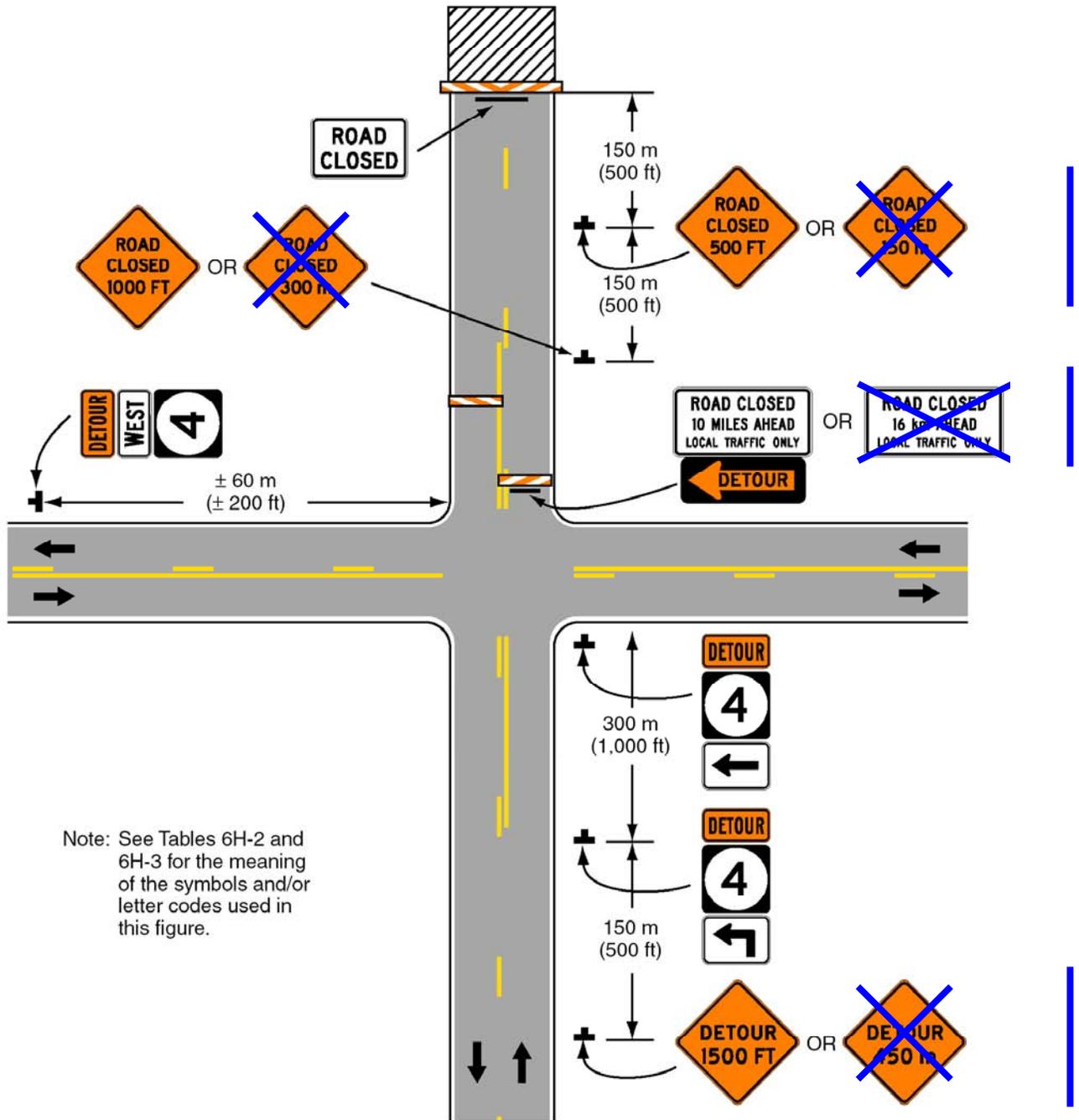
1. Regulatory traffic control devices should be modified as needed for the duration of the detour.

Option:

2. If the road is opened for some distance beyond the intersection and/or there are significant origin/destination points beyond the intersection, the ROAD CLOSED and DETOUR signs on Type III Barricades may be located at the edge of the traveled way.
  3. A Route Sign Directional assembly may be placed on the far left corner of the intersection to augment or replace the one shown on the near right corner.
  4. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
  5. Cardinal direction plaques may be used with route signs.
- 

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**Figure 6H-8. Road Closure with Off-Site Detour (TA-8)**



**Typical Application 8**

## Notes for Figure 6H-9—Typical Application 9

### Overlapping Routes with Detour

Support:

1. TTC devices are shown for one direction of travel only.

**Standard:**

- 2. Devices similar to those depicted shall be placed for the opposite direction of travel.**

Guidance:

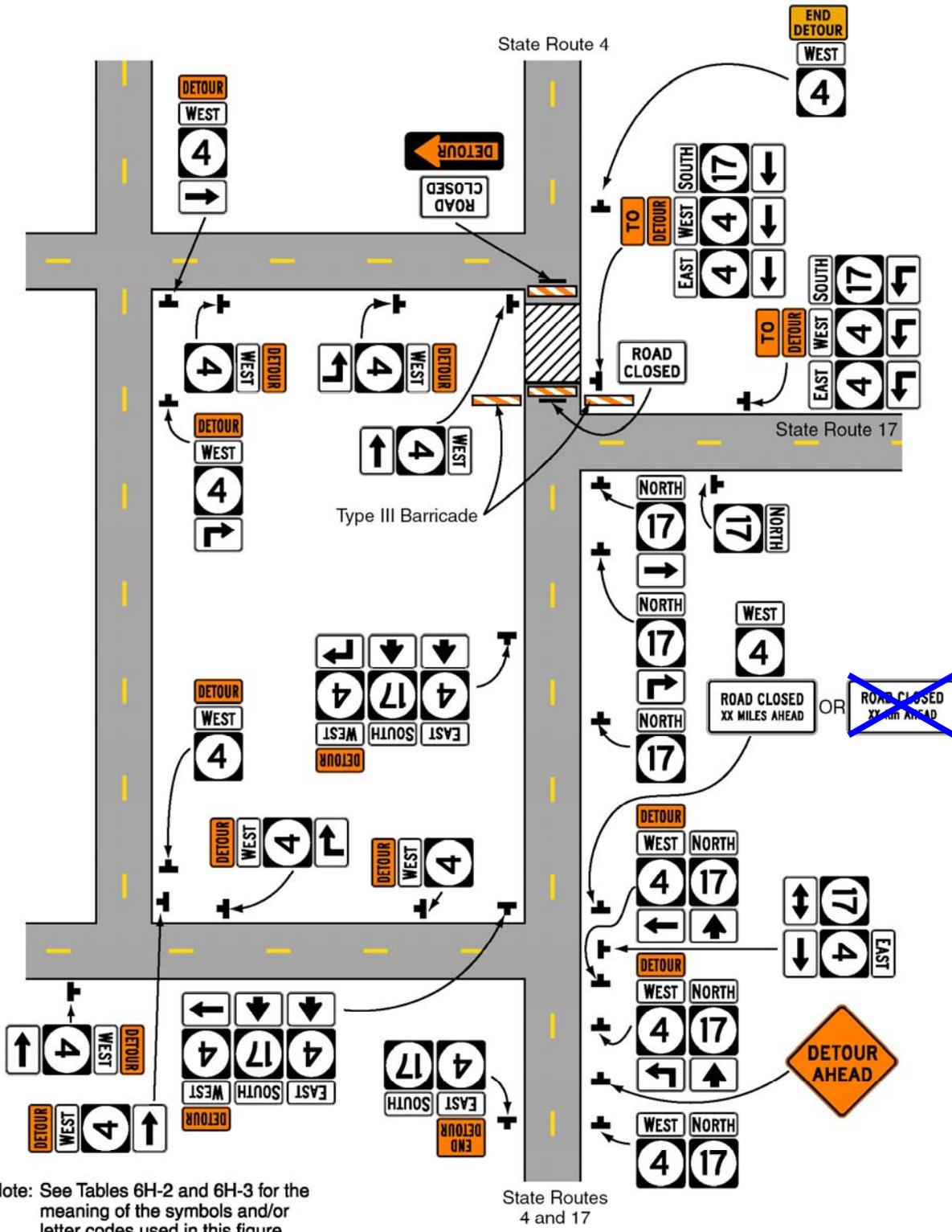
3. STOP signs displayed to side roads should be installed as needed along the temporary route.

Option:

4. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
  5. Flashing warning lights may be used on the Type III Barricades.
  6. Cardinal direction plaques may be used with route signs.
- 

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**Figure 6H-9. Overlapping Routes with Detour (TA-9)**



Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

**Typical Application 9**

## Notes for Figure ~~6H-10~~ 6H-10(CA)—Typical Application 10

### Lane Closure on Two-Lane Road Using Flaggers

Option:

1. For low-volume 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~~ after the Flagger sign and the ONE LANE ROAD sign.
7. When a highway-rail 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 highway-rail grade crossing, the TTC zone should be extended so that the transition area precedes the highway-rail grade crossing.
8. When a highway-rail 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 highway-rail grade crossing exists within the activity area, drivers operating on the left side of the normal centerline should be provided with comparable warning devices as for drivers operating on the right side of the normal centerline.
10. Early coordination with the railroad company should occur before work starts.

Option:

11. A flagger or a uniformed law enforcement officer may be used at the highway-rail grade crossing to minimize the probability that vehicles are stopped within 4.6 m (15 ft) of the highway-rail grade crossing, measured from both sides of the outside rails.

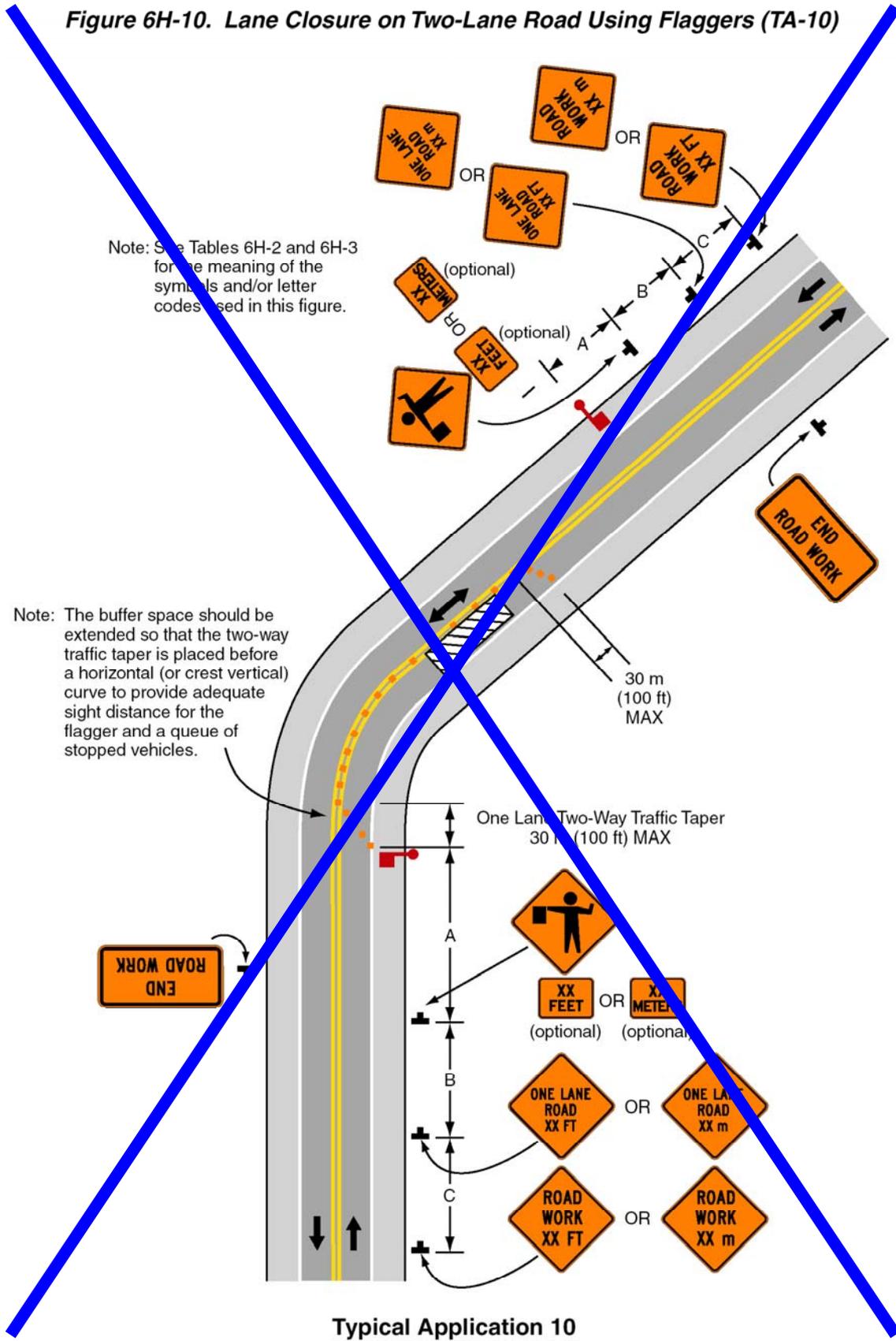
Support:

12. For State highways, see Department of Transportation's Standard Plan T13. See Section 1A.11 for information regarding this publication.

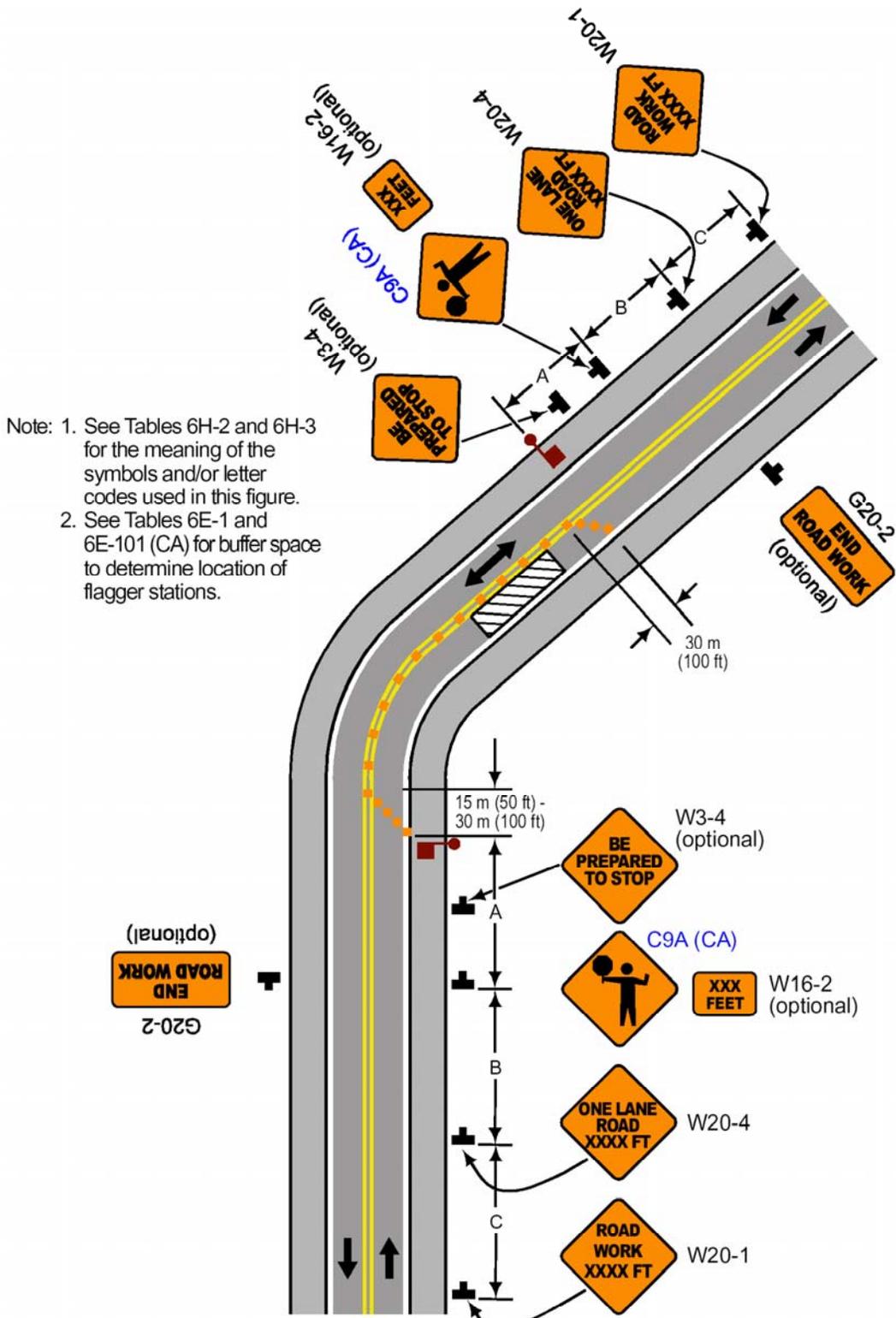
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**Figure 6H-10. Lane Closure on Two-Lane Road Using Flaggers (TA-10)**



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



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 10**

### Notes for Figure 6H-11—Typical Application 11

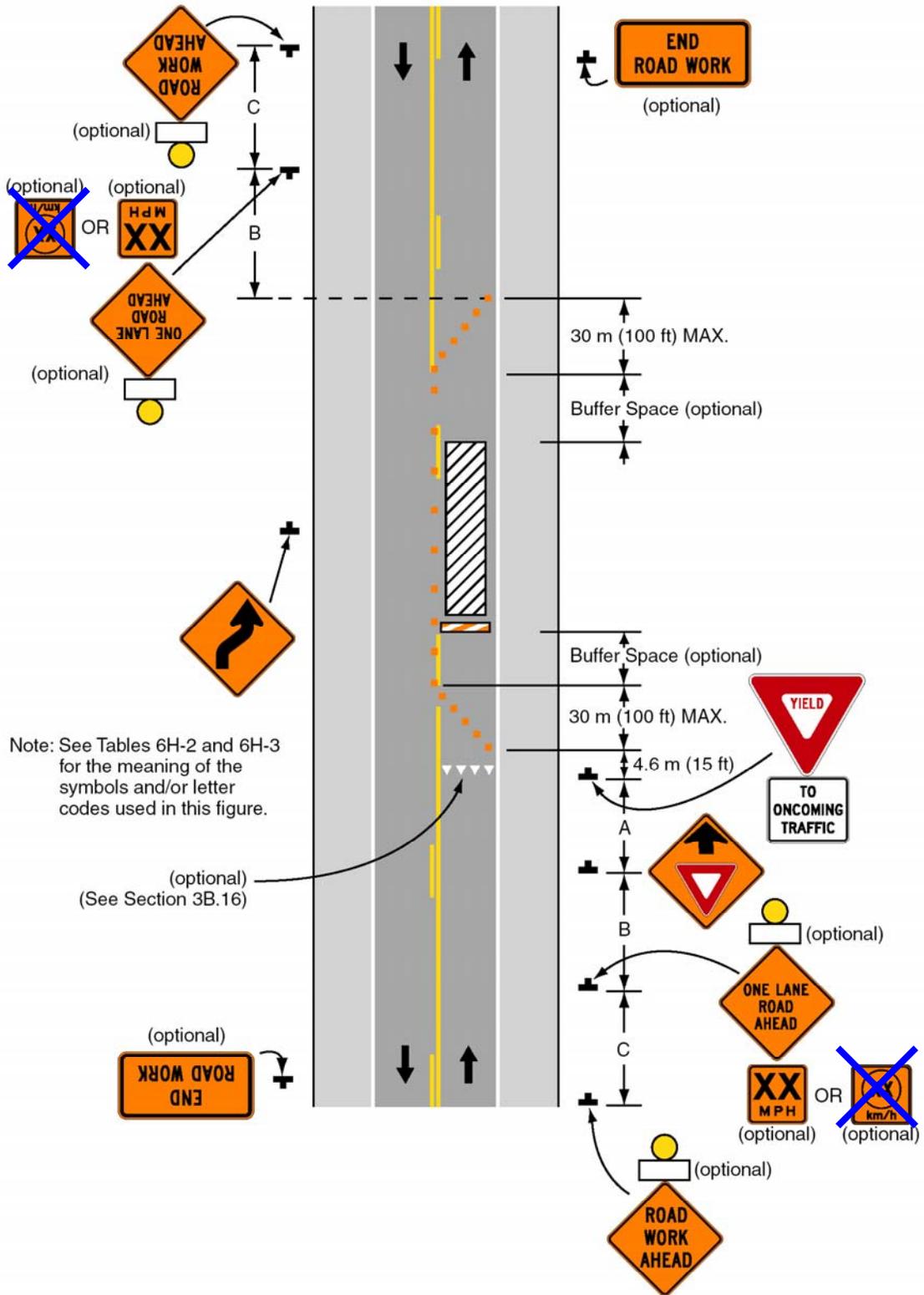
#### Lane Closure on Two-Lane Road with Low Traffic Volumes

Option:

1. This TTC zone application may be used as an alternate to the TTC application shown in Figure ~~6H-10~~ 6H-10(CA) (using flaggers) when the following conditions exist:
    - a. Vehicular traffic volume is such that sufficient gaps exist for vehicular traffic that must yield.
    - b. Road users from both directions are able to see approaching vehicular traffic through and beyond the work site and have sufficient visibility of approaching vehicles.
  2. The Type B flashing warning lights may be placed on the ROAD WORK AHEAD and the ONE LANE ROAD AHEAD signs whenever a night lane closure is necessary.
- 

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**Figure 6H-11. Lane Closure on Two-Lane Road with Low Traffic Volumes**



**Typical Application 11**

**Notes for Figure ~~6H-12~~ 6H-12(CA)—Typical Application 12**

**Lane Closure on Two-Lane Road Using Traffic Control Signals**

**Standard:**

- 1. TTC signals shall be installed and operated in accordance with the provisions of Part 4. TTC signals shall meet the physical display and operational requirements of conventional traffic control signals.**
- 2. TTC signal timing shall be established by authorized officials. Durations of red clearance intervals shall be adequate to clear the one-lane section of conflicting vehicles.**
- 3. When the TTC signal is changed to the flashing mode, either manually or automatically, red signal indications shall be flashed to both approaches.**
- 4. Stop lines shall be installed with TTC signals for intermediate and long-term closures. Existing conflicting pavement markings and raised pavement marker reflectors between the activity area and the stop line shall be removed. After the TTC signal is removed, the stop lines and other temporary pavement markings shall be removed and the permanent pavement markings restored.**
- 5. Safeguards shall be incorporated to avoid the possibility of conflicting signal indications at each end of the TTC zone.**

**Guidance:**

6. Where no-passing lines are not already in place, they should be added.
7. Adjustments in the location of the advance warning signs should be made as needed to accommodate the horizontal or vertical alignment of the roadway, recognizing that the distances shown for sign spacings are minimums. Adjustments in the height of the signal heads should be made as needed to conform to the vertical alignment.

**Option:**

8. Flashing warning lights shown on the ROAD WORK AHEAD and the ONE LANE ROAD AHEAD signs may be used.
9. Removable pavement markings may be used.

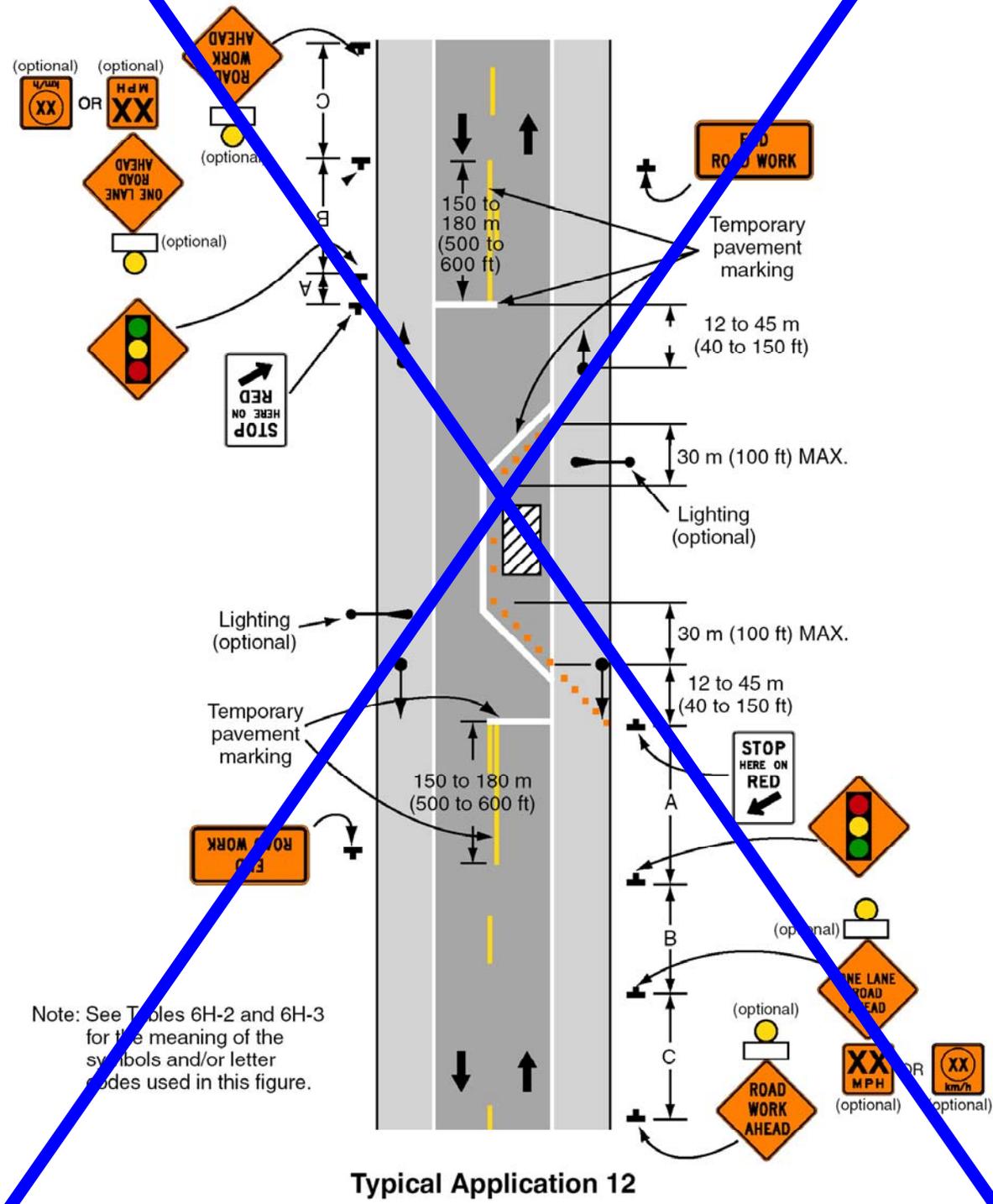
**Support:**

10. TTC signals are preferable to flaggers for long-term projects and other activities that would require flagging at night.
11. The maximum length of activity area for one-way operation under TTC signal control is determined by the capacity required to handle the peak demand.

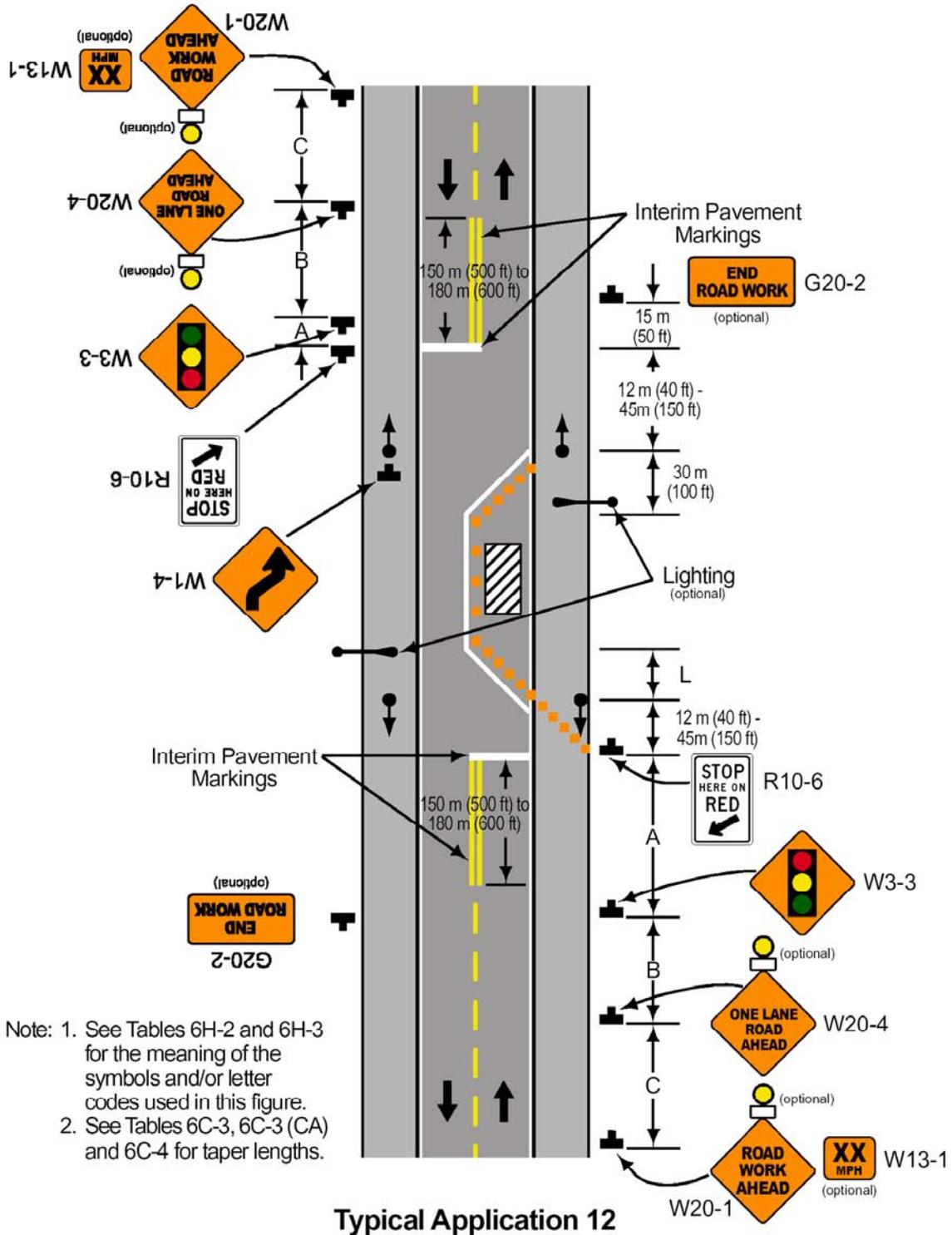
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**Figure 6H-12. Lane Closure on Two-Lane Road Using Traffic Control Signals (TA-12)**



**Figure 6H-12 (CA). Lane Closure on Two-Lane Road Using Traffic Control Signals (TA-12)**



**Notes for Figure ~~6H-13~~ 6H-13(CA)—Typical Application 13**

**Temporary Road Closure**

Support:

1. Conditions represented are a planned closure not exceeding 20 minutes during the daytime.

**Standard:**

- 2. A flagger or uniformed law enforcement officer shall be used for this application. The flagger, if used for this application, shall follow the procedures noted in Sections 6E.04 and 6E.05.**

Guidance:

3. The uniformed law enforcement officer, if used for this application, should follow the procedures noted in Sections 6E.04 and 6E.05.

Option:

4. A BE PREPARED TO STOP sign may be added to the sign series.

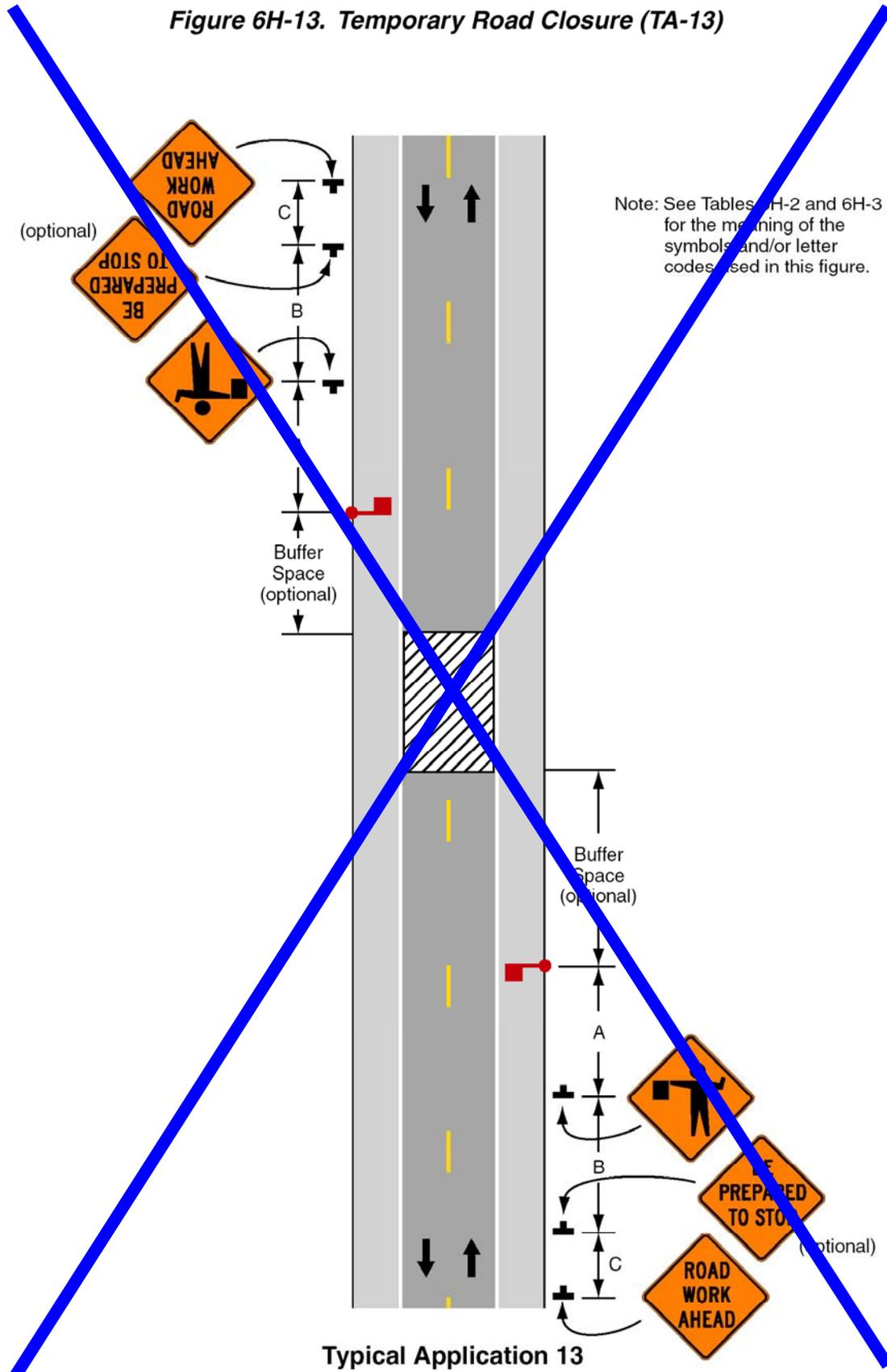
Guidance:

5. When used, the BE PREPARED TO STOP sign should be located ~~before~~ after the Flagger symbol sign.

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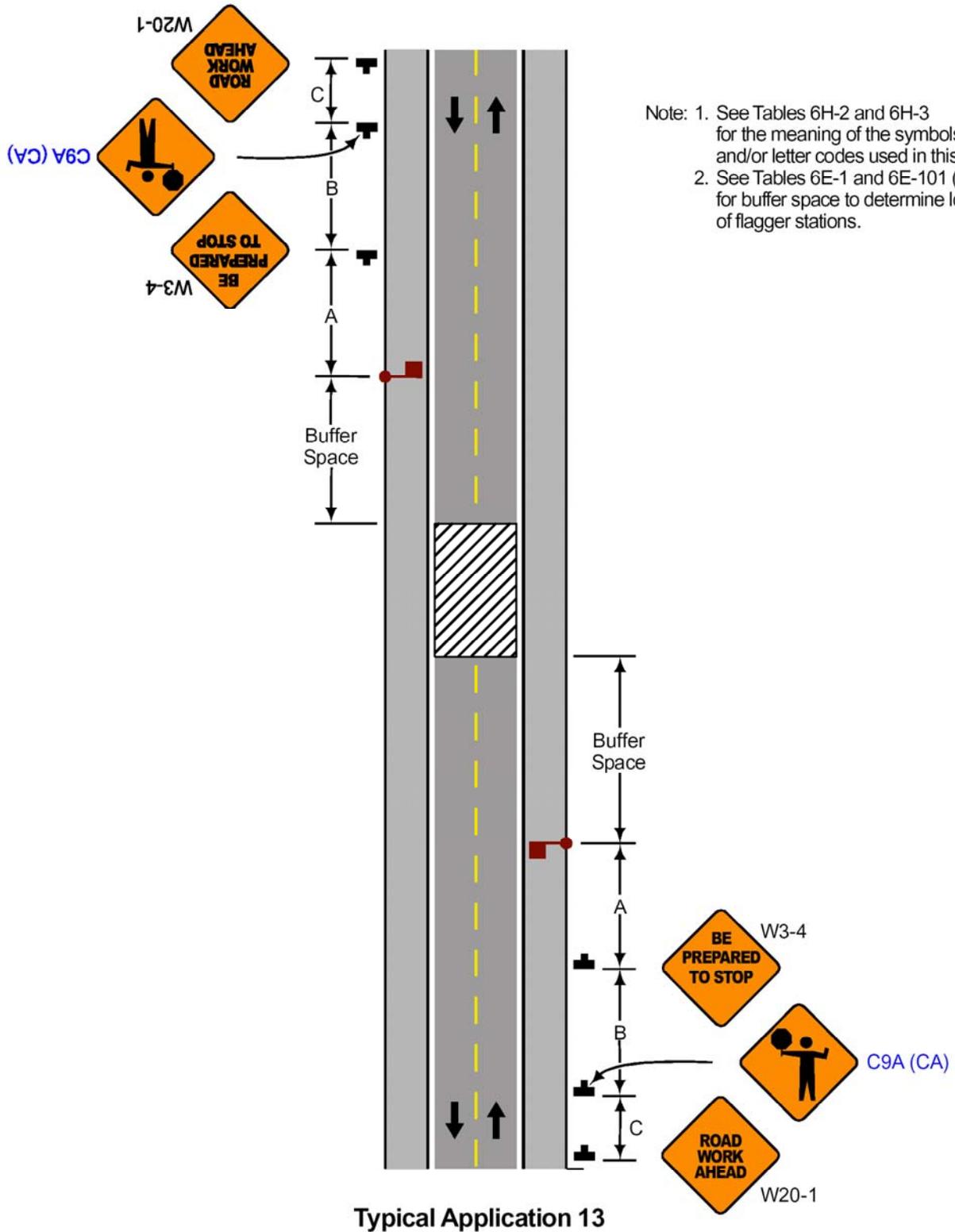
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Figure 6H-13. Temporary Road Closure (TA-13)



Typical Application 13

Figure 6H-13 (CA). Temporary Road Closure (TA-13)



**Notes for Figure ~~6H-14~~ 6H-14(CA)—Typical Application 14**

**Haul Road Crossing**

**Guidance:**

1. Floodlights should be used to illuminate haul road crossings where existing light is inadequate.
2. Where no passing lines are not already in place, they should be added.

**Standard:**

- 3. The traffic control method selected shall be used in both directions.**

**Flagging Method**

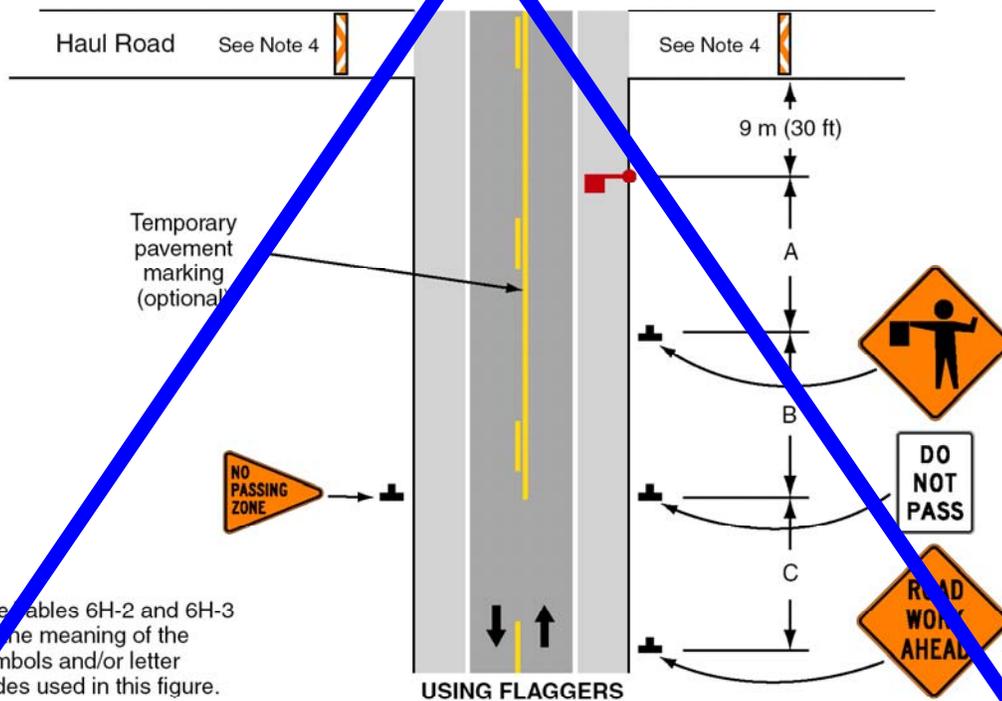
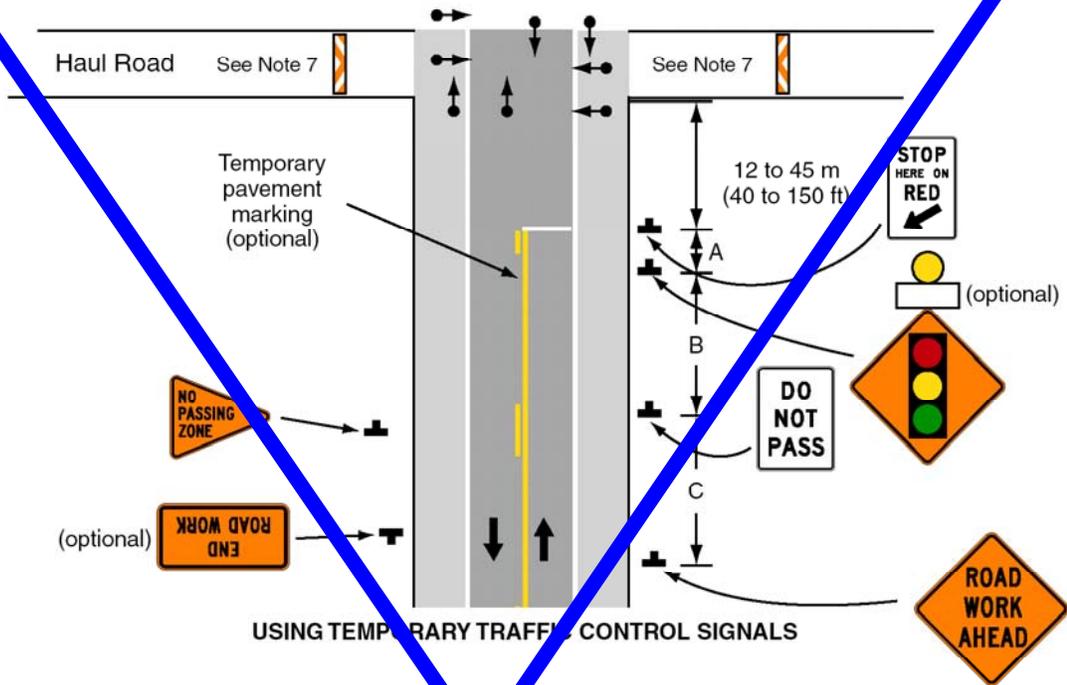
- 4. When a road used exclusively as a haul road is not in use, the haul road shall be closed with Type III barricades and the Flagger symbol signs covered.**
- 5. The flagger shall follow the procedures noted in Sections 6E.04 and 6E.05.**
- 6. At night, flagger stations shall be illuminated, except in emergencies.**

**Signalized Method**

- 7. When a road used exclusively as a haul road is not in use, Type III barricades shall be in place. The signals shall either flash yellow on the main road or be covered, and the Signal Ahead and STOP HERE ON RED signs shall be covered or hidden from view.**
  - 8. The TTC signals shall control both the highway and the haul road and shall meet the physical display and operational requirements of conventional traffic control signals as described in Part 4. Traffic control signal timing shall be established by authorized officials.**
  - 9. Stop lines shall be used on existing highway with TTC signals.**
  - 10. Existing conflicting pavements markings between the stop lines shall be removed. After the TTC signal is removed, the stop lines and other temporary pavement markings shall be removed and the permanent pavement markings restored.**
- 

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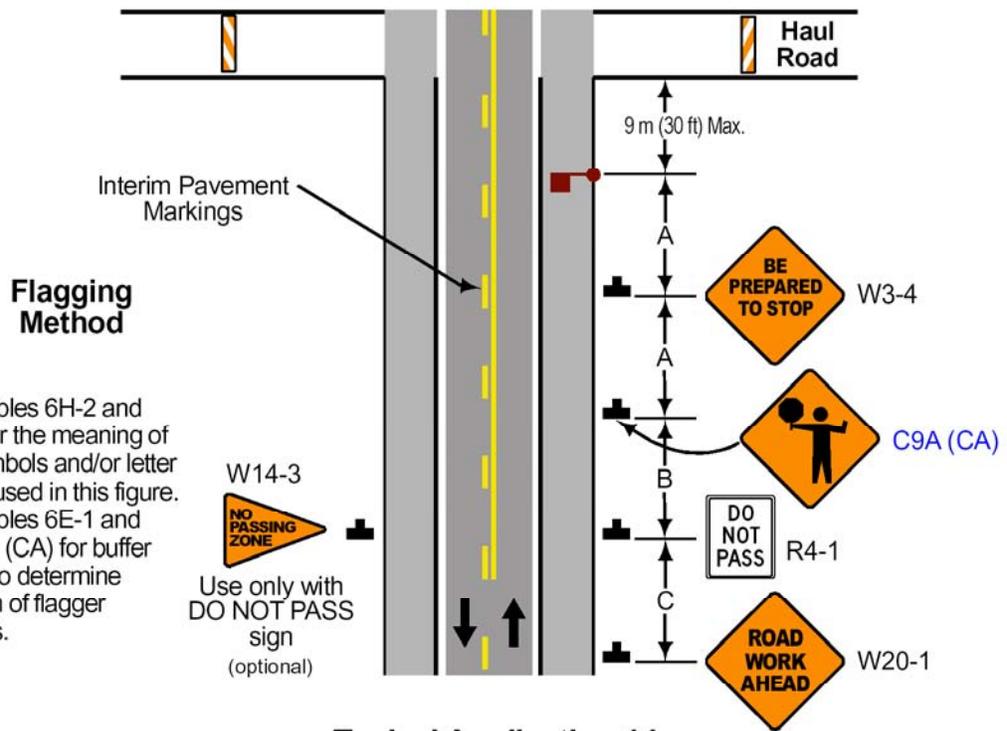
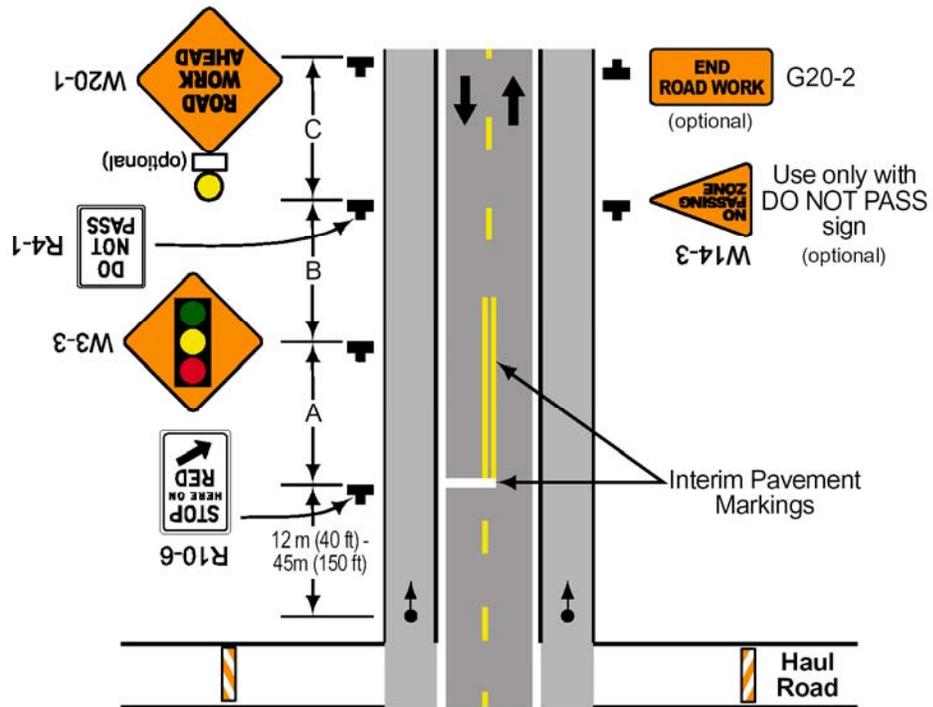
**Figure 6H-14. Haul Road Crossing (TA-14)**



Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

**Typical Application 14**

Figure 6H-14 (CA). Haul Road Crossing (TA-14)



- 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.

W14-3  
 NO PASSING ZONE  
 Use only with DO NOT PASS sign (optional)

Typical Application 14

## Notes for Figure 6H-15—Typical Application 15

### Work in Center of Road with Low Traffic Volumes

**Guidance:**

1. The lanes on either side of the center work space should have a minimum width of 3 m (10 ft) as measured from the near edge of the channelizing devices to the edge of pavement or the outside edge of paved shoulder.
2. Workers in the roadway should wear high-visibility safety apparel as described in Section 6D.03.

**Option:**

3. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
4. If the closure continues overnight, warning lights may be used on the channelizing devices.
5. A lane width of 2.7 m (9 ft) may be used for short-term stationary work on low-volume, low-speed roadways when motor vehicle traffic does not include longer and wider heavy commercial vehicles.

**Standard:**

Note 5 is not applicable for State highways. Note #1 shall be used instead for State highways.

**Option:**

6. A work vehicle displaying high-intensity rotating, flashing, oscillating, or strobe lights may be used instead of the channelizing devices forming the tapers or the high-level warning devices.
7. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing, oscillating, or strobe lights.

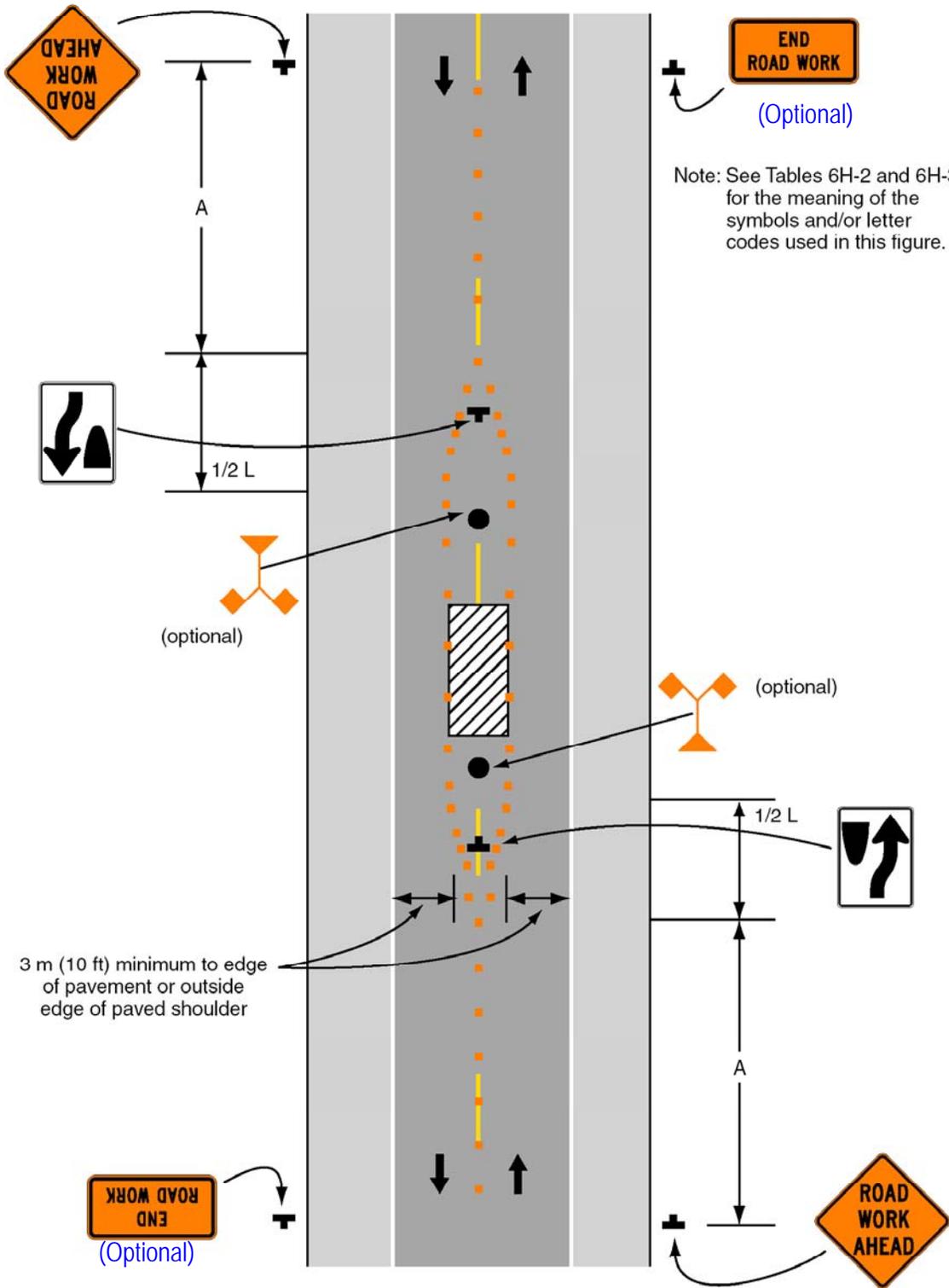
**Standard:**

8. Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights.

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**Figure 6H-15. Work in Center of Road with Low Traffic Volumes (TA-15)**



**Typical Application 15**

## Notes for Figure 6H-16—Typical Application 16

### Surveying Along Centerline of Road with Low Traffic Volumes

#### Guidance:

1. Cones should be placed 150 mm (6 in) to 300 mm (12 in) on either side of the centerline.
2. When using metric units, spacing of channelizing devices should not exceed a distance in meters equal to 1/5 of the speed limit (km/h) when used for taper channelization and a distance in meters equal to 2/5 of the speed limit (km/h) when used for tangent channelization. When using English units, spacing of channelizing devices should not exceed a distance in feet equal to the speed limit (mph) when used for the taper channelization and a distance in feet of 2 times the speed limit (mph) when used for tangent channelization.
3. A flagger should be used to warn workers who cannot watch road users.
4. Workers in the roadway should wear high-visibility safety apparel as described in Section 6D.03.

#### Standard:

- 5. For surveying on the centerline of a high-volume road, one lane shall be closed using the information illustrated in Figure ~~6H-10~~ 6H-10(CA).**

#### Option:

6. A high-level warning device may be used to protect a surveying device, such as a target on a tripod.
7. Cones may be omitted for a cross-section survey.
8. ROAD WORK AHEAD signs may be used in place of the SURVEY CREW AHEAD signs.
9. Flags may be used to call attention to the advance warning signs.
10. If the work is along the shoulder, the flagger may be omitted.
11. For a survey along the edge of the road or along the shoulder, cones may be placed along the edge line.
12. A BE PREPARED TO STOP sign may be added to the sign series.

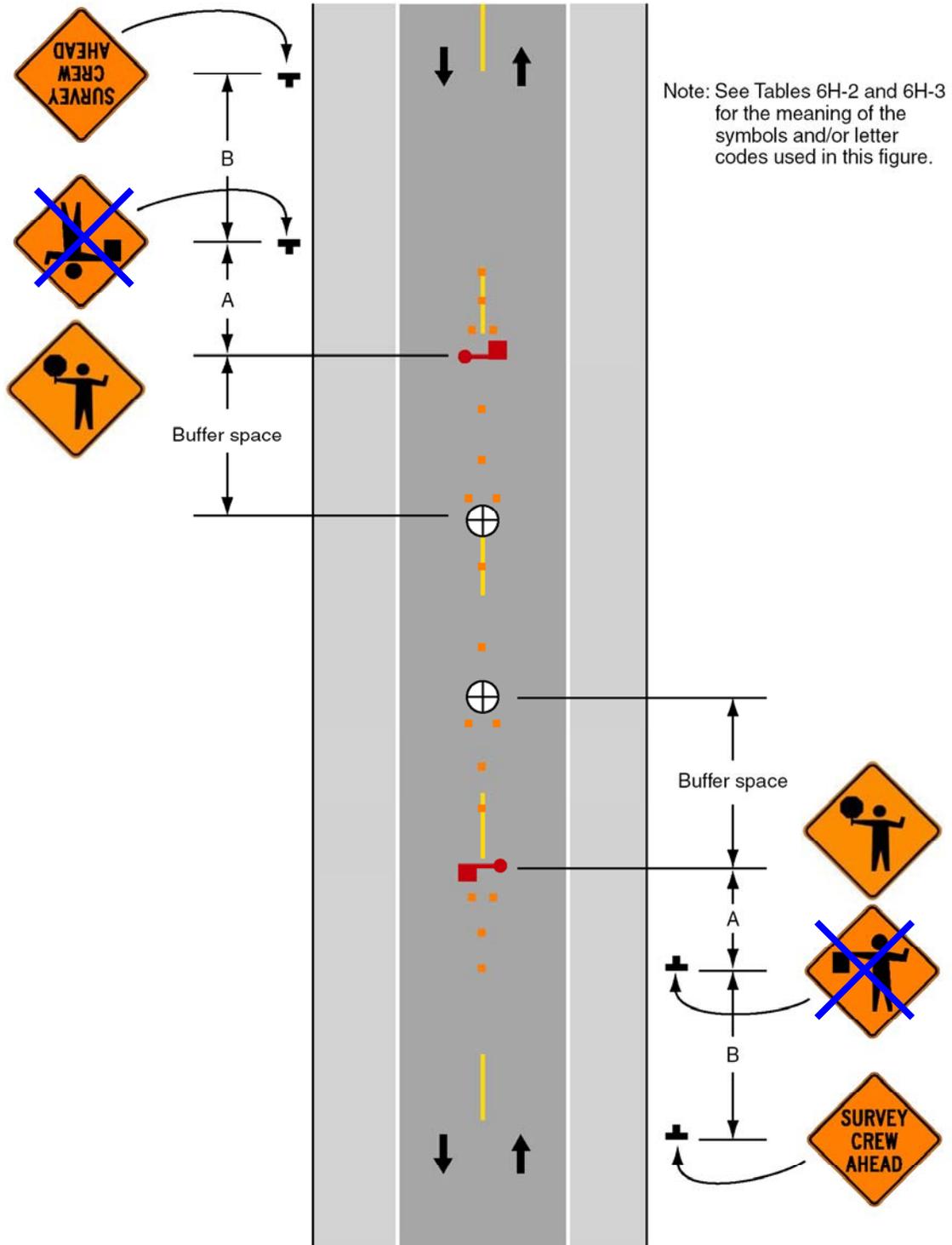
#### Guidance:

13. When used, the BE PREPARED TO STOP sign should be located ~~before~~ after the Flagger symbol sign.

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**Figure 6H-16. Surveying Along Centerline of Road with Low Traffic Volumes (TA-16)**



**Typical Application 16**

## Notes for Figure 6H-17—Typical Application 17

### Mobile Operations on 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 panel 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.

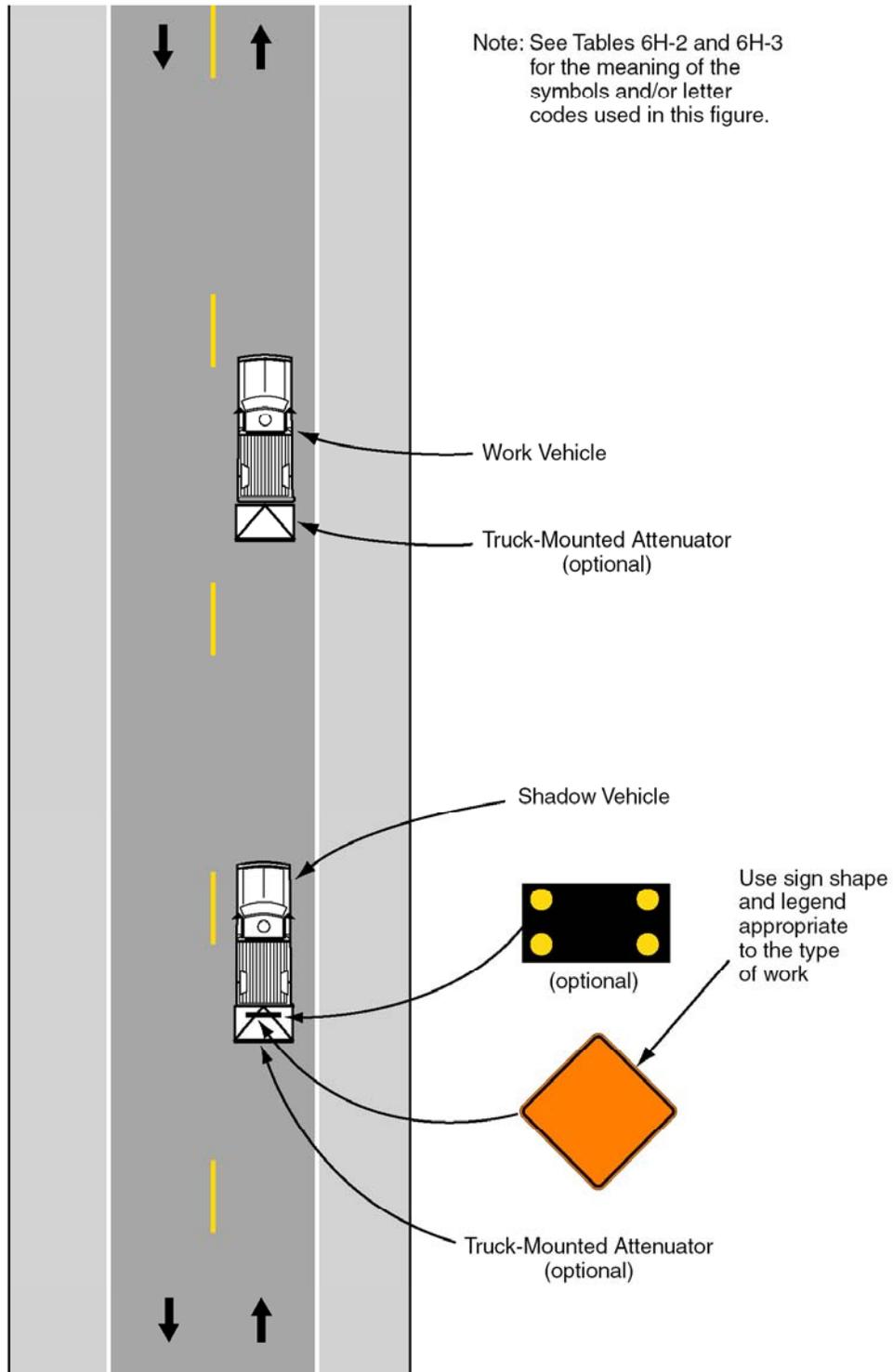
#### Standard:

12. **Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights.**

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



**Typical Application 17**

## Notes for Figure 6H-18—Typical Application 18

### Lane Closure on Minor Street

**Standard:**

1. This TTC shall be used only for low-speed facilities having low traffic volumes.

**Option:**

2. Where the work space is short, where road users can see the roadway beyond, and where volume is low, vehicular traffic may be self-regulating.

**Standard:**

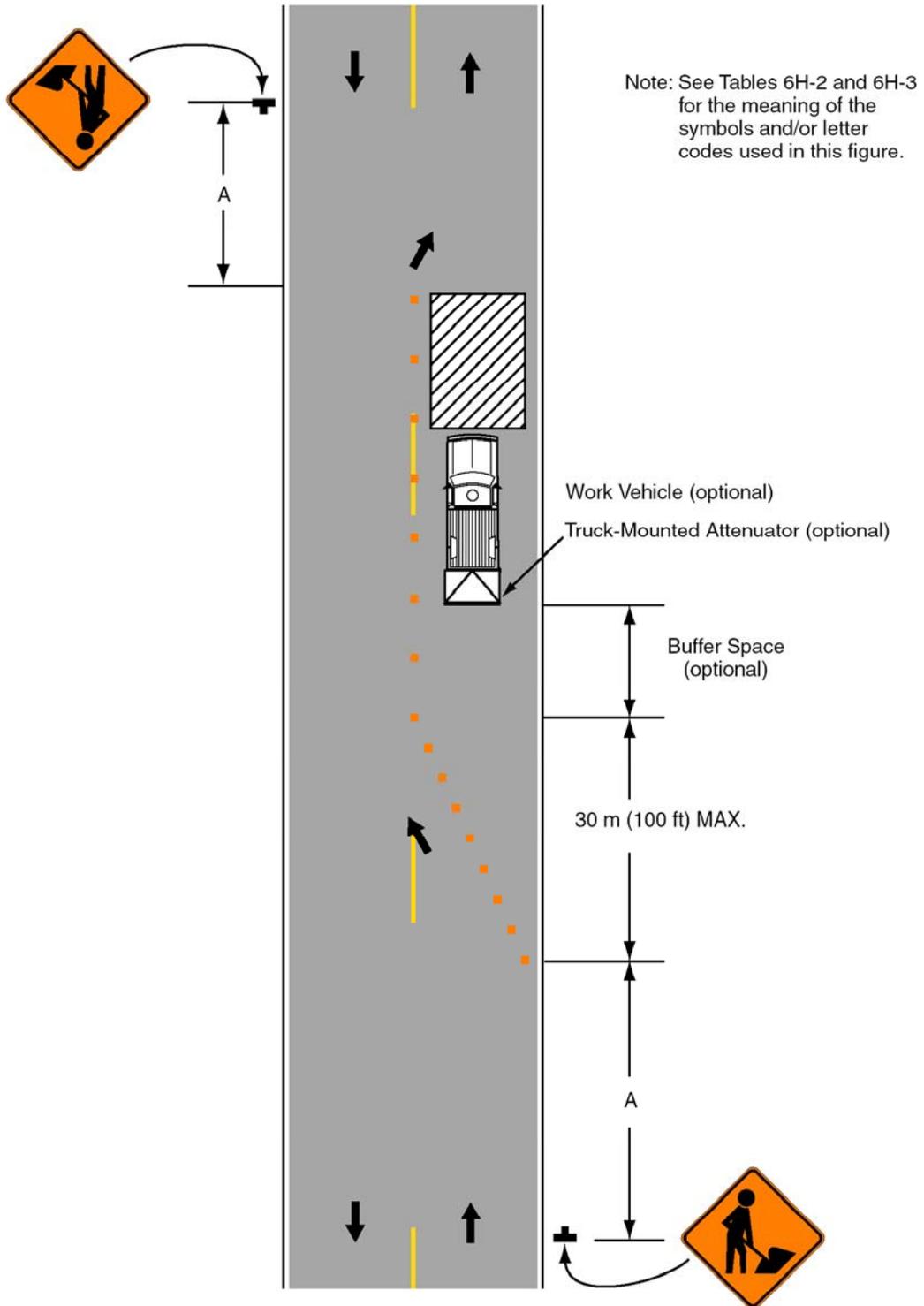
3. Where vehicular traffic cannot effectively self-regulate, one or two flaggers shall be used as illustrated in Figure ~~6H-10~~ 6H-10(CA).

**Option:**

4. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
  5. A truck-mounted attenuator may be used on the work vehicle and the shadow vehicle.
- 

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**Figure 6H-18. Lane Closure on Minor Street (TA-18)**



**Typical Application 18**

## Notes for Figure 6H-19—Typical Application 19

### Detour for One Travel Direction

**Guidance:**

1. This plan should be used for streets without posted route numbers.
2. On multi-lane streets, Detour signs with an Advance Turn Arrow should be used in advance of a turn.

**Option:**

3. The STREET CLOSED legend may be used in place of ROAD CLOSED.
4. Additional DO NOT ENTER signs may be used at intersections with intervening streets.
5. Warning lights may be used on Type III Barricades.
6. Detour signs may be located on the far side of intersections.
7. A Street Name sign may be mounted with the Detour sign. The Street Name sign may be either white on green or black on orange.

**Standard:**

- 8. When used, the Street Name sign shall be placed above the Detour sign.**

**Guidance:**

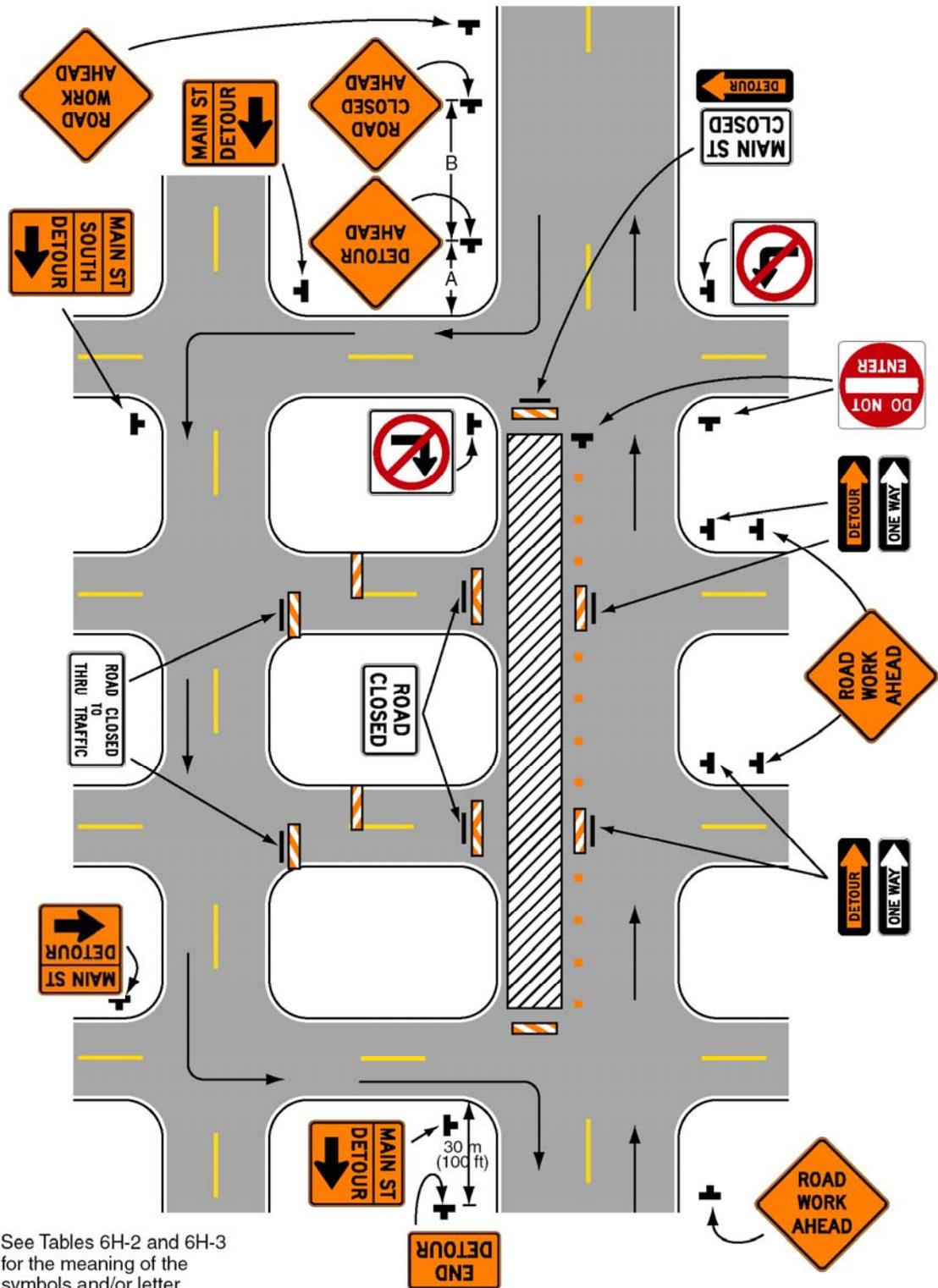
9. The DETOUR (M4-8) sign should be placed on tangent sections at intervals not to exceed 400 m (1300 ft) and at major intersections.

**Option:**

10. In urban areas, the M4-8 signs may be placed at every intersection.
- 

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Figure 6H-19. Detour for One Travel Direction (TA-19)



Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

Typical Application 19

## Notes for Figure 6H-20—Typical Application 20

### Detour for Closed Street

**Guidance:**

1. This plan should be used for streets without posted route numbers.
2. On multi-lane streets, Detour signs with an Advance Turn Arrow should be used in advance of a turn.

**Option:**

3. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
4. Flashing warning lights may be used on Type III Barricades.
5. Detour signs may be located on the far side of intersections. A Detour sign with an advance arrow may be used in advance of a turn.
6. A Street Name sign may be mounted with the Detour sign. The Street Name sign may be either white on green or black on orange.

**Standard:**

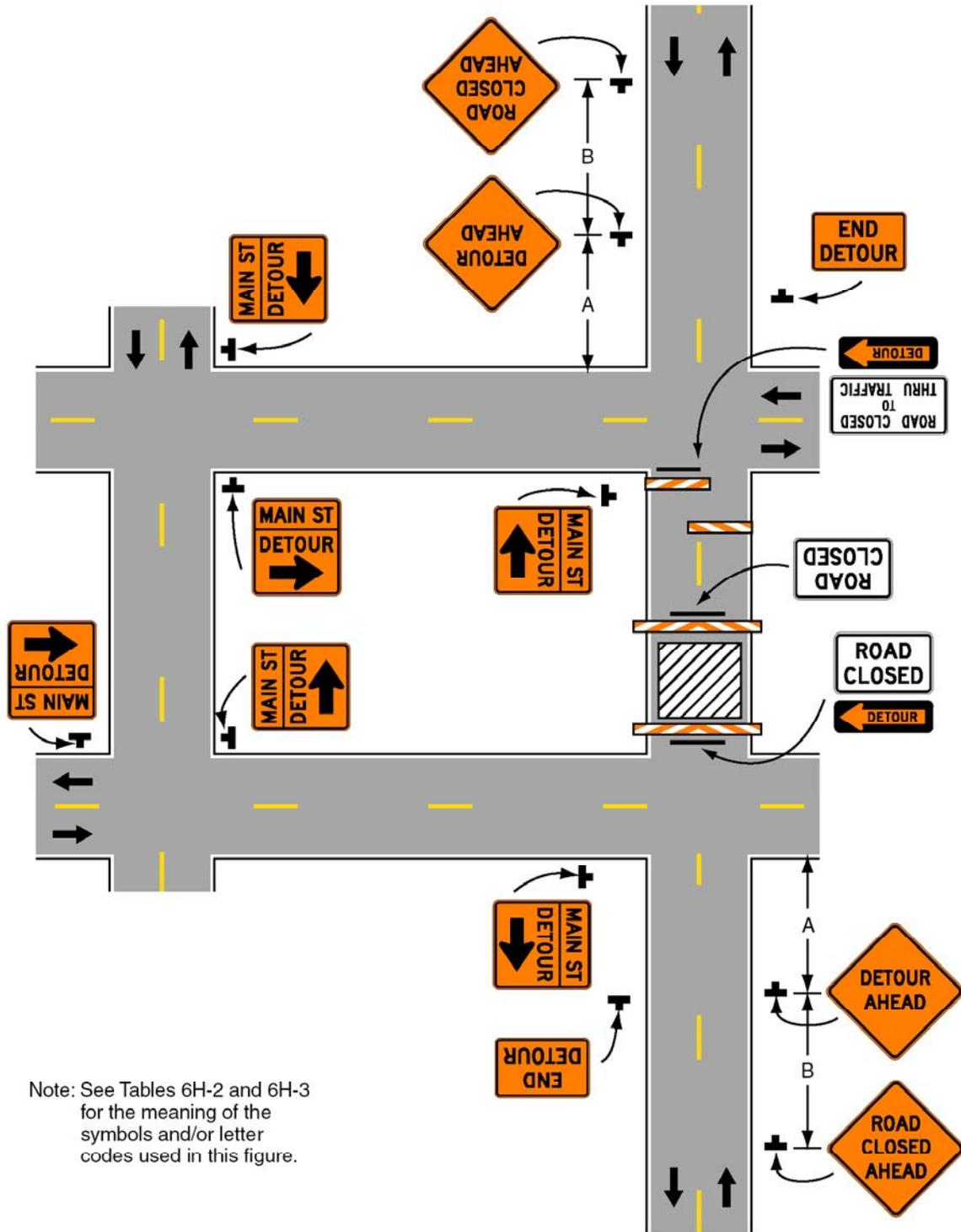
- 7. When used, the Street Name sign shall be placed above the Detour sign.**

**Support:**

8. See Figure 6H-9 for the information for detouring a numbered highway.
- 

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Figure 6H-20. Detour for Closed Street (TA-20)



Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

Typical Application 20

## Notes for Figure 6H-21—Typical Application 21

### Lane Closure on Near Side of Intersection

**Standard:**

- 1. The merging taper shall direct vehicular traffic into either the right or left lane, but not both.**

Guidance:

2. In this typical application, a left taper should be used so that right-turn movements will not impede through motor vehicle traffic. However, the reverse should be true for left-turn movements.
3. If the work space extends across a crosswalk, the crosswalk should be closed using the information and devices shown in Figure 6H-29.

Option:

4. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
5. A shadow vehicle with a truck-mounted attenuator may be used.
6. A work vehicle with high-intensity rotating, flashing, oscillating, or strobe lights may be used with the high-level warning device.
7. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing, oscillating, or strobe lights.

**Standard:**

- 8. Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights.**

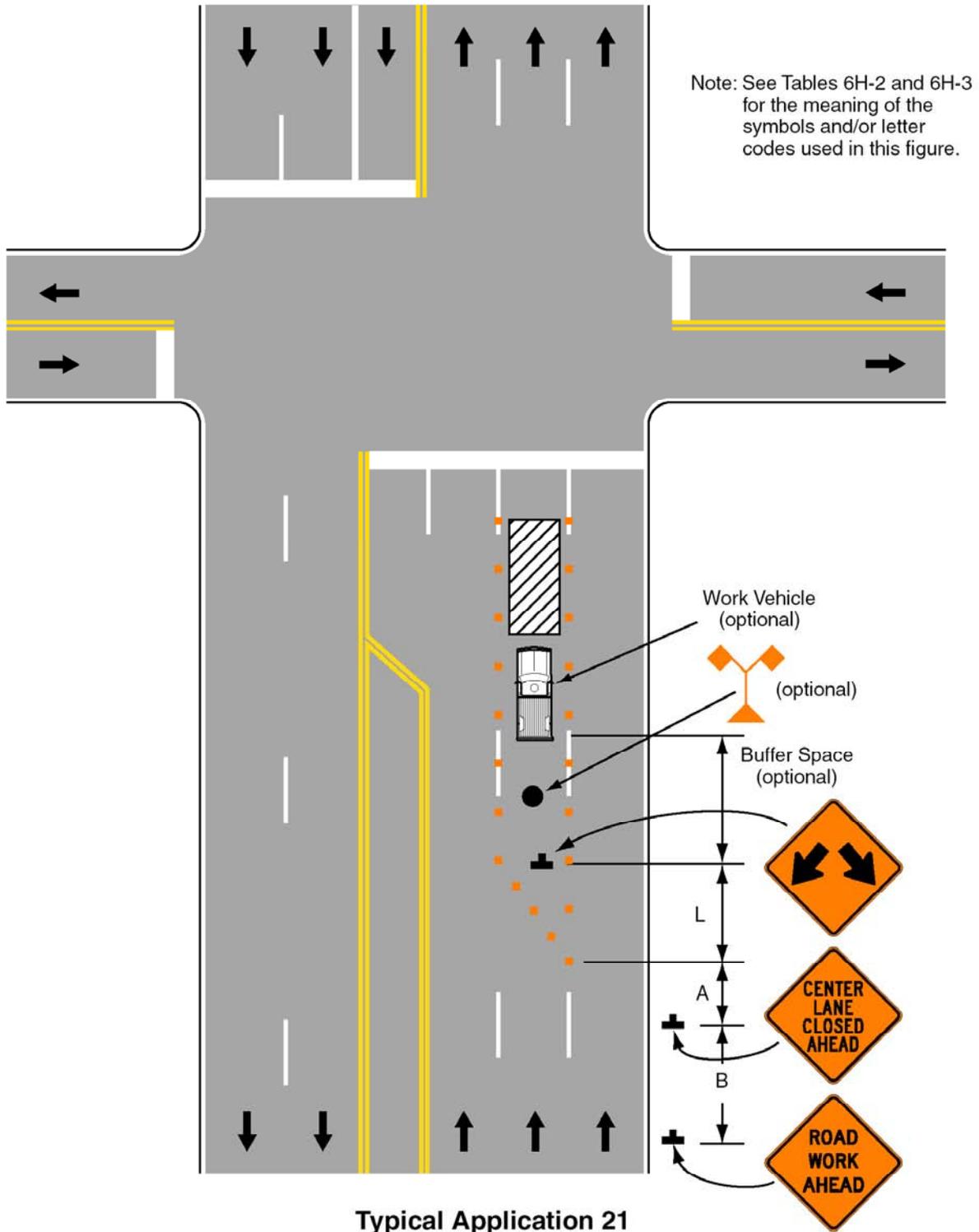
Option:

9. A vehicle-mounted arrow panel may be used to supplement this package.

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**Figure 6H-21. Lane Closure on Near Side of Intersection (TA-21)**



## **Notes for Figure 6H-22—Typical Application 22**

### **Right Lane Closure on Far Side of Intersection**

**Guidance:**

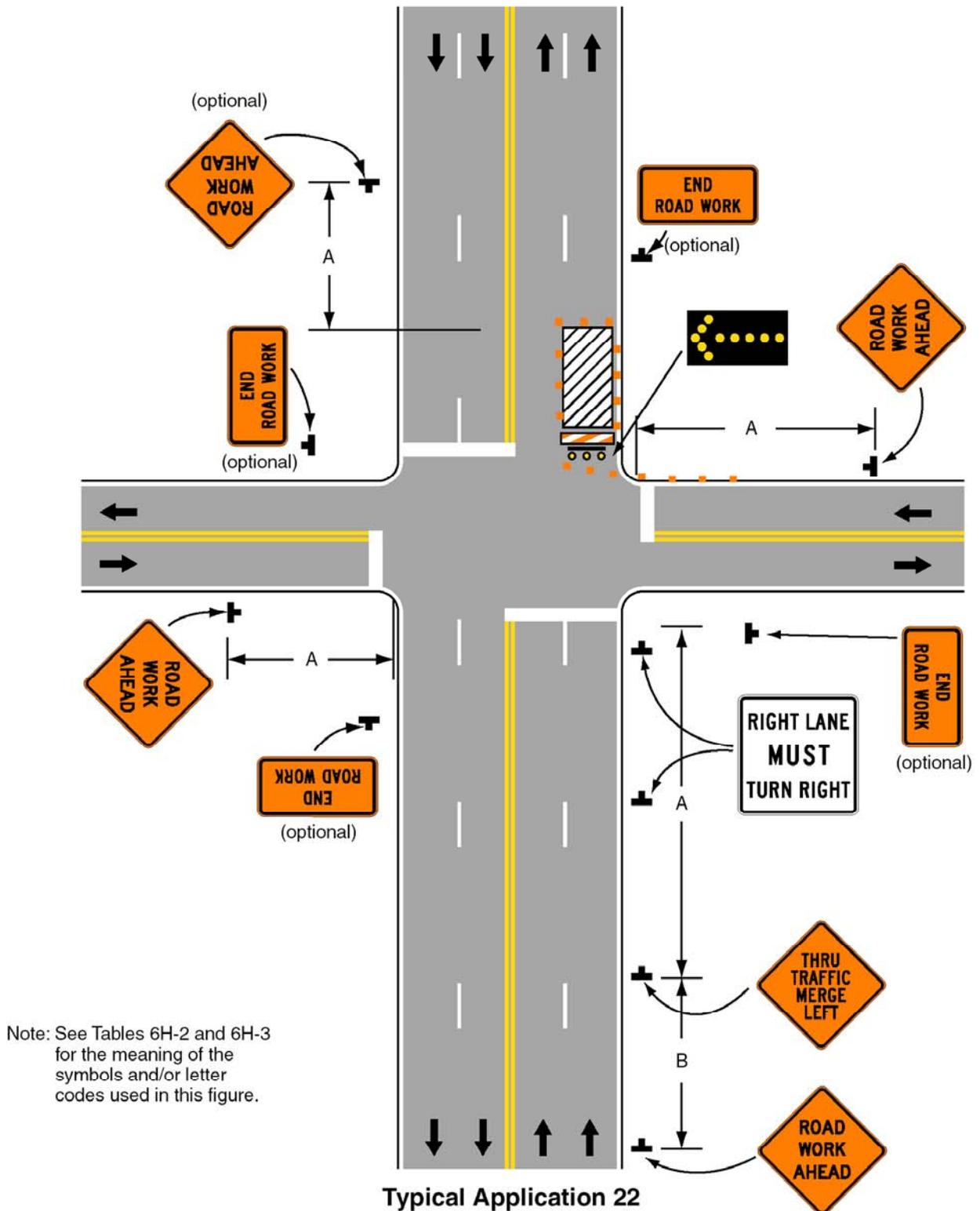
1. If the work space extends across a crosswalk, the crosswalk should be closed using the information and devices shown in Figure 6H-29.

**Option:**

2. The normal procedure is to close on the near side of the intersection any lane that is not carried through the intersection. However, when this results in the closure of a right lane having significant right turning movements, then the right lane may be restricted to right turns only, as shown. This procedure increases the through capacity by eliminating right turns from the open through lane.
  3. For intersection approaches reduced to a single lane, left-turning movements may be prohibited to maintain capacity for through vehicular traffic.
  4. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
  5. Where the turning radius is large, it may be possible to create a right-turn island using channelizing devices or pavement markings.
- 

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**Figure 6H-22. Right Lane Closure on Far Side of Intersection (TA-22)**



## Notes for Figure 6H-23—Typical Application 23

### Left Lane Closure on Far Side of Intersection

Guidance:

1. If the work space extends across a crosswalk, the crosswalk should be closed using the information and devices shown in Figure 6H-29.

Option:

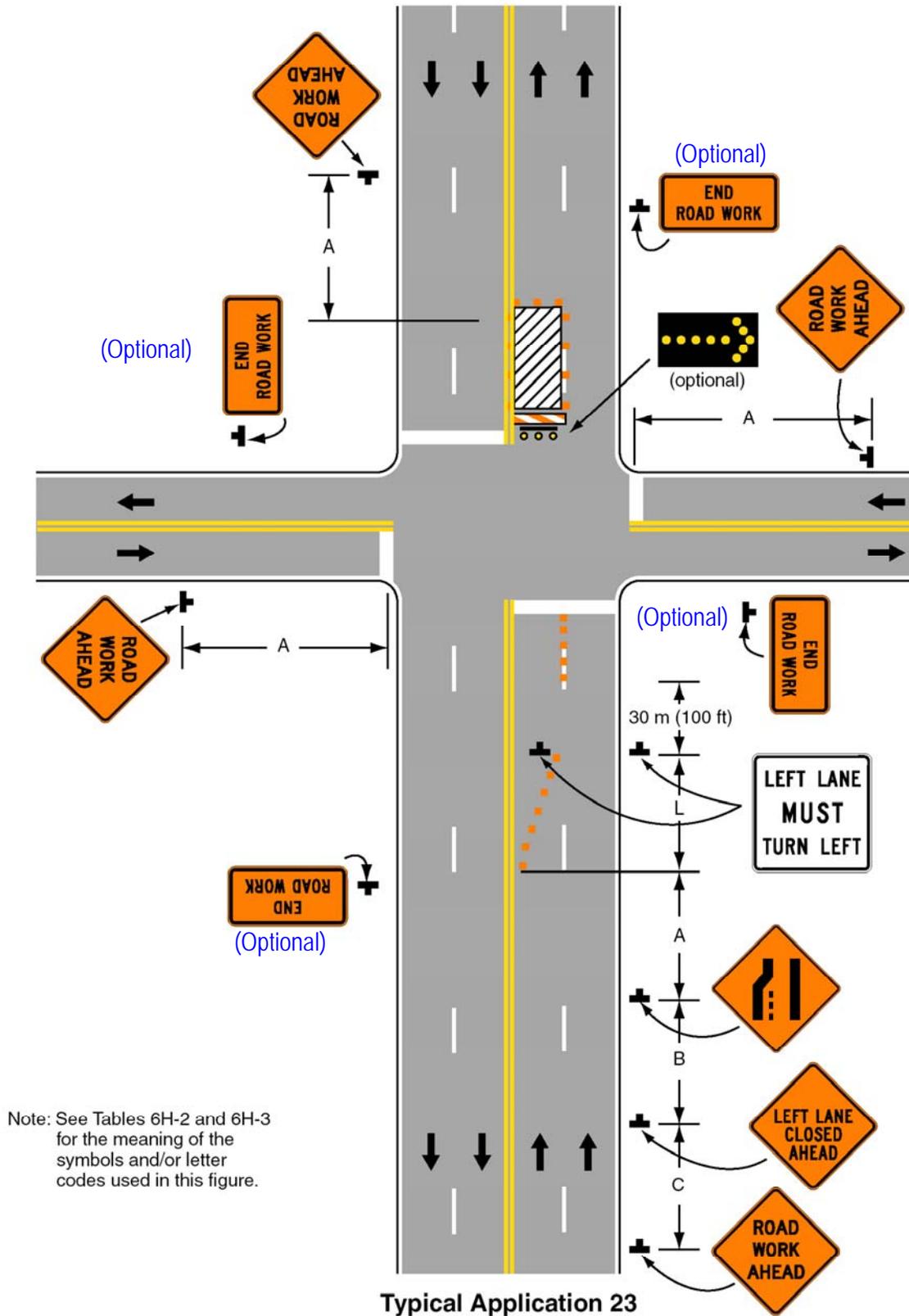
2. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
3. The normal procedure is to close on the near side of the intersection any lane that is not carried through the intersection. However, when this results in the closure of a left lane having significant left-turning movements, then the left lane may be reopened as a turn bay for left turns only, as shown.

Support:

4. By first closing off the left lane and then reopening it as a turn bay, an island is created with channelizing devices that allows the LEFT LANE MUST TURN LEFT sign to be repeated on the left adjacent to the lane that it controls.
- 

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**Figure 6H-23. Left Lane Closure on Far Side of Intersection (TA-23)**



## Notes for Figure 6H-24—Typical Application 24

### Half Road Closure on Far Side of Intersection

Guidance:

1. If the work space extends across a crosswalk, the crosswalk should be closed using the information and devices shown in Figure 6H-29.
2. When turn prohibitions are implemented, two turn prohibition signs should be used, one on the near side and, space permitting, one on the far side of the intersection.

Option:

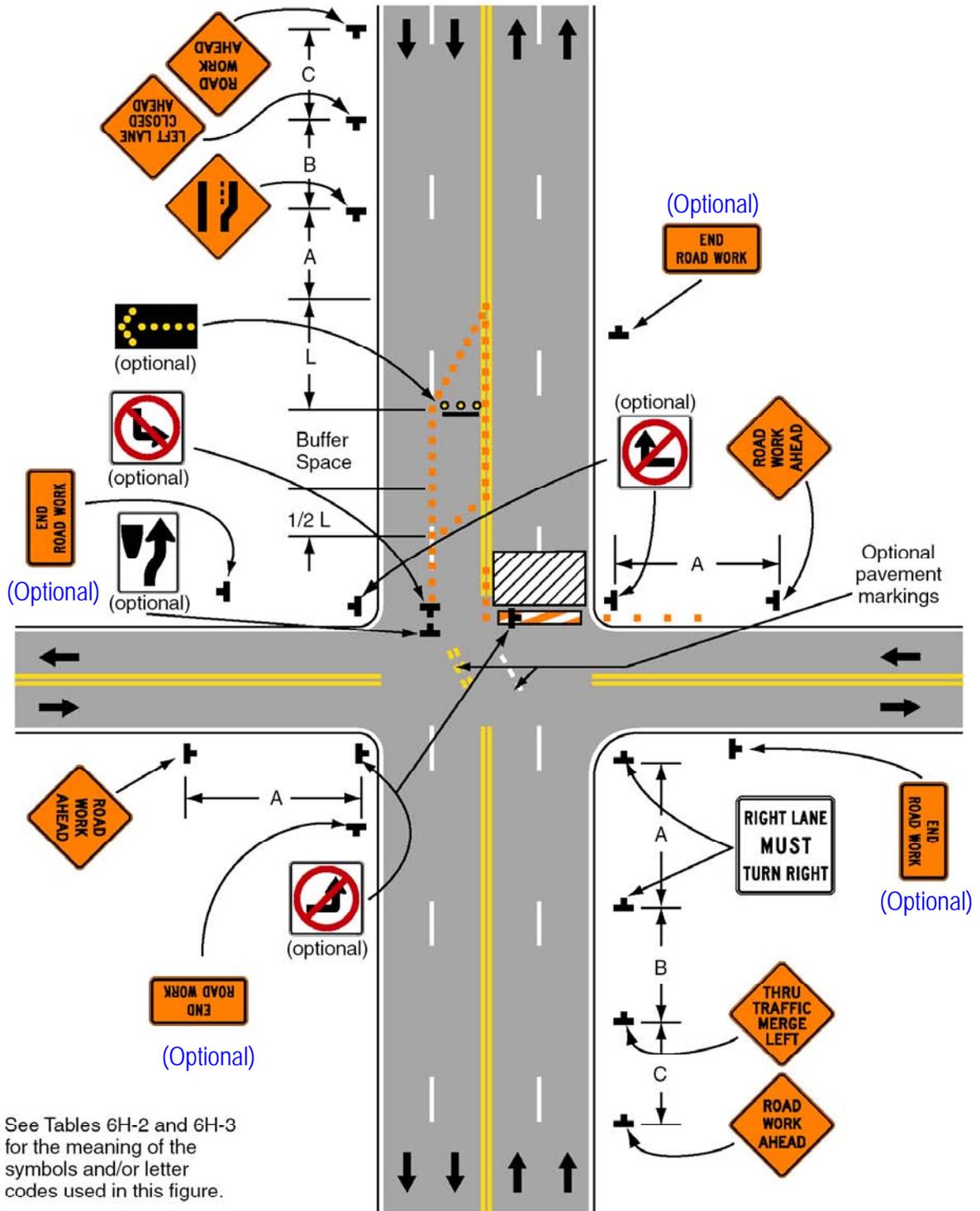
3. A buffer space may be used between opposing directions of vehicular traffic as shown in this application.
4. The normal procedure is to close on the near side of the intersection any lane that is not carried through the intersection. However, if there is a significant right-turning movement, then the right lane may be restricted to right turns only, as shown.
5. Where the turning radius is large, a right-turn island using channelizing devices or pavement markings may be used.
6. There may be insufficient space to place the back-to-back Keep Right sign and No Left Turn symbol signs at the end of the row of channelizing devices separating opposing vehicular traffic flows. In this situation, the No Left Turn symbol sign may be placed on the right and the Keep Right sign may be omitted.
7. For intersection approaches reduced to a single lane, left-turning movements may be prohibited to maintain capacity for through vehicular traffic.
8. Flashing warning lights and/or flags may be used to call attention to advance warning signs.
9. Temporary pavement markings may be used to delineate the travel path through the intersection.

Support:

10. Keeping the right lane open increases the through capacity by eliminating right turns from the open through lane.
  11. A temporary turn island reinforces the nature of the temporary exclusive right-turn lane and enables a second RIGHT LANE MUST TURN RIGHT sign to be placed in the island.
- 

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**Figure 6H-24. Half Road Closure on Far Side of Intersection (TA-24)**



Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

**Typical Application 24**

## Notes for Figure 6H-25—Typical Application 25

### Multiple Lane Closures at Intersection

Guidance:

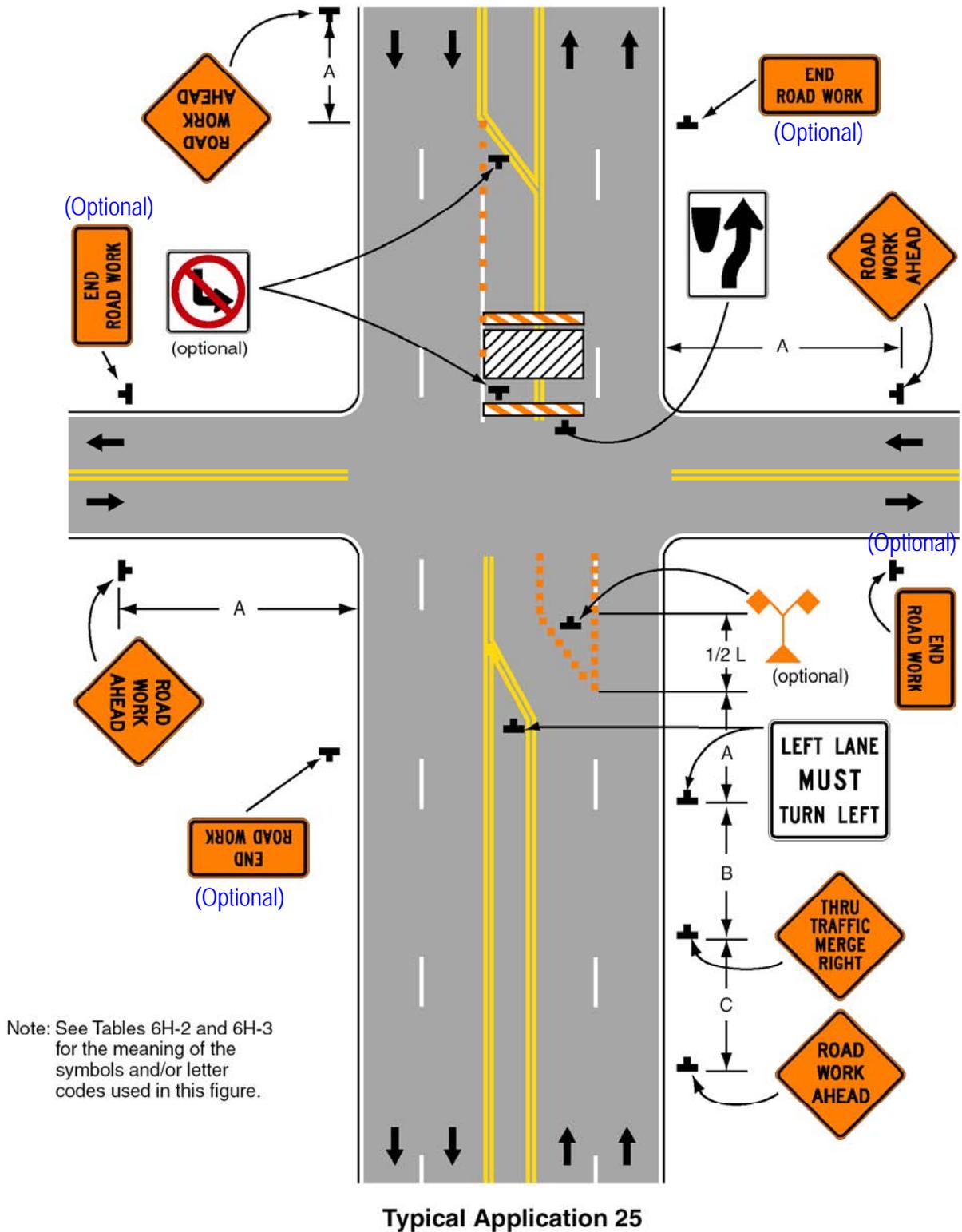
1. If the work space extends across a crosswalk, the crosswalk should be closed using the information and devices shown in Figure 6H-29.
2. If the left through lane is closed on the near-side approach, the LEFT LANE MUST TURN LEFT sign should be placed in the median to discourage through vehicular traffic from entering the left-turn bay.

Option:

3. The normal procedure is to close on the near side of the intersection any lane that is not carried through the intersection. If the left-turning movement that normally uses the closed turn bay is small and/or the gaps in opposing vehicular traffic are frequent, left turns may be permitted on that approach.
  4. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
- 

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**Figure 6H-25. Multiple Lane Closures at Intersection (TA-25)**



Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

## Notes for Figure 6H-26—Typical Application 26

### Closure in Center of Intersection

**Guidance:**

1. All lanes should be a minimum of 3 m (10 ft) in width as measured to the near face of the channelizing devices.

**Option:**

2. A high-level warning device may be placed in the work space, if there is sufficient room.
3. For short-term use on low-volume, low-speed roadways with vehicular traffic that does not include longer and wider heavy commercial vehicles, a minimum lane width of 2.7 m (9 ft) may be used.

**Standard:**

Note #3 is not applicable for State highways. Note #1 shall be used instead for State highways.

**Option:**

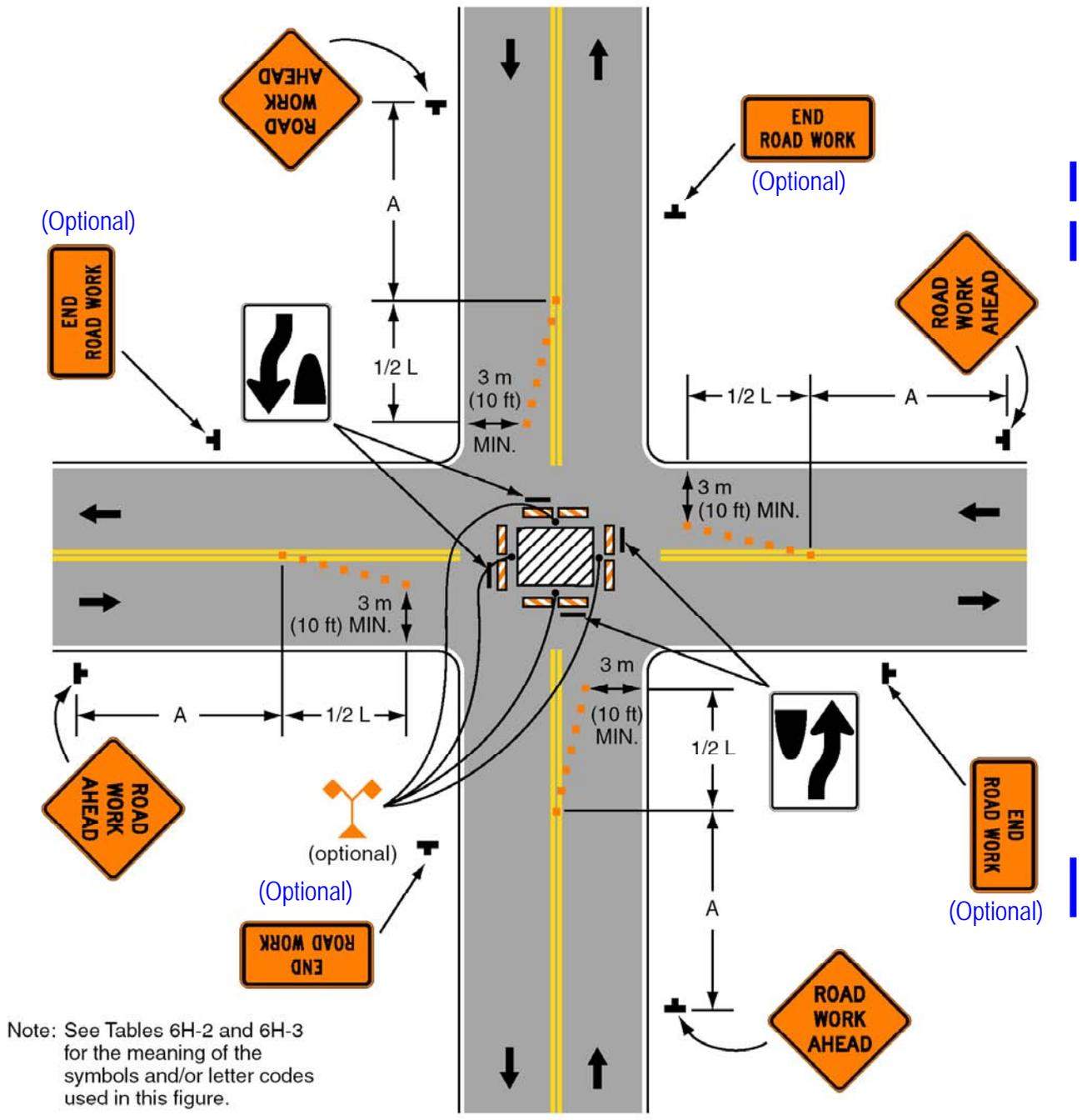
4. Flashing warning lights and/or flags may be used to call attention to advance warning signs.
5. Unless the streets are wide, it may be physically impossible to turn left, especially for large vehicles. Left turns may be prohibited as required by geometric conditions.
6. For short-duration work operations, the channelizing devices may be eliminated if a vehicle displaying high-intensity rotating, flashing, oscillating, or strobe lights is positioned in the work space.
7. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing, oscillating, or strobe lights.

**Standard:**

8. Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights.
- 

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**Figure 6H-26. Closure in Center of Intersection (TA-26)**



Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

**Typical Application 26**

## Notes for Figure 6H-27—Typical Application 27

### Closure at Side of Intersection

**Guidance:**

1. The situation depicted can be simplified by closing one or more of the intersection approaches. If this cannot be done, and/or when capacity is a problem, through vehicular traffic should be directed to other roads or streets.
2. Depending on road user conditions, flagger(s) or uniformed law enforcement officer(s) should be used to direct road users within the intersection.

**Standard:**

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

**Option:**

4. ONE LANE ROAD AHEAD signs may also be used to provide adequate advance warning.
5. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
6. For short-duration work operations, the channelizing devices may be eliminated if a vehicle displaying high-intensity rotating, flashing, oscillating, or strobe lights is positioned in the work space.
7. A BE PREPARED TO STOP sign may be added to the sign series.

**Guidance:**

8. When used, the BE PREPARED TO STOP sign should be located ~~before~~ after the Flagger symbol sign.

**Support:**

9. Turns can be prohibited as required by vehicular traffic conditions. Unless the streets are wide, it might be physically impossible to make certain turns, especially for large vehicles.

**Option:**

10. Vehicle hazard warning signals may be used to supplement high-intensity rotating, flashing, oscillating, or strobe lights.

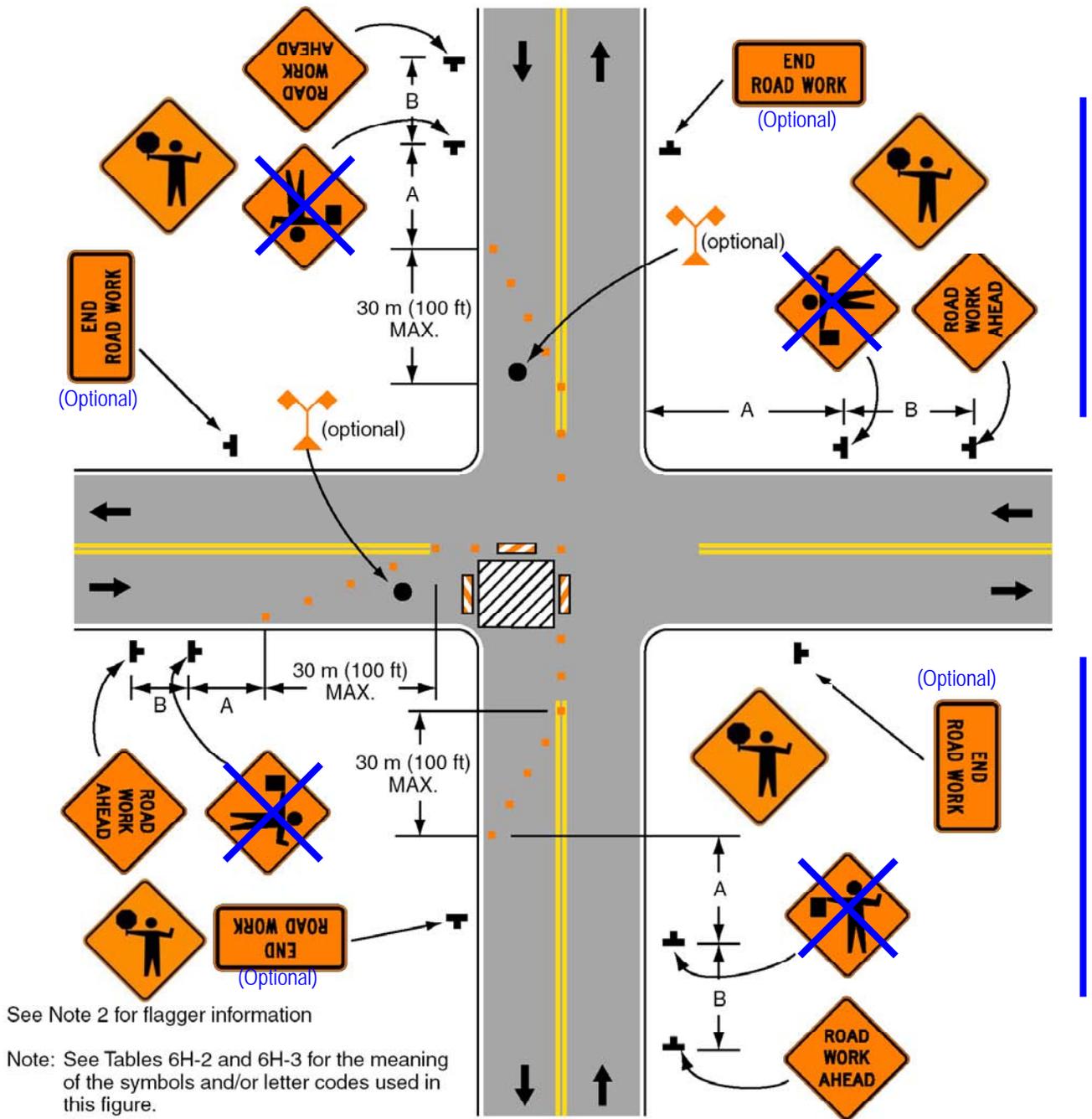
**Standard:**

- 11. Vehicle hazard warning signals shall not be used instead of the vehicle's high-intensity rotating, flashing, oscillating, or strobe lights.**

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**Figure 6H-27. Closure at Side of Intersection (TA-27)**



**Typical Application 27**

## Notes for Figure 6H-28—Typical Application 28

### Sidewalk Closures and Bypass Sidewalks

**Standard:**

- 1. When crosswalks or other pedestrian facilities are closed or relocated, temporary facilities shall be detectable and shall include accessibility features consistent with the features present in the existing pedestrian facility.**

**Guidance:**

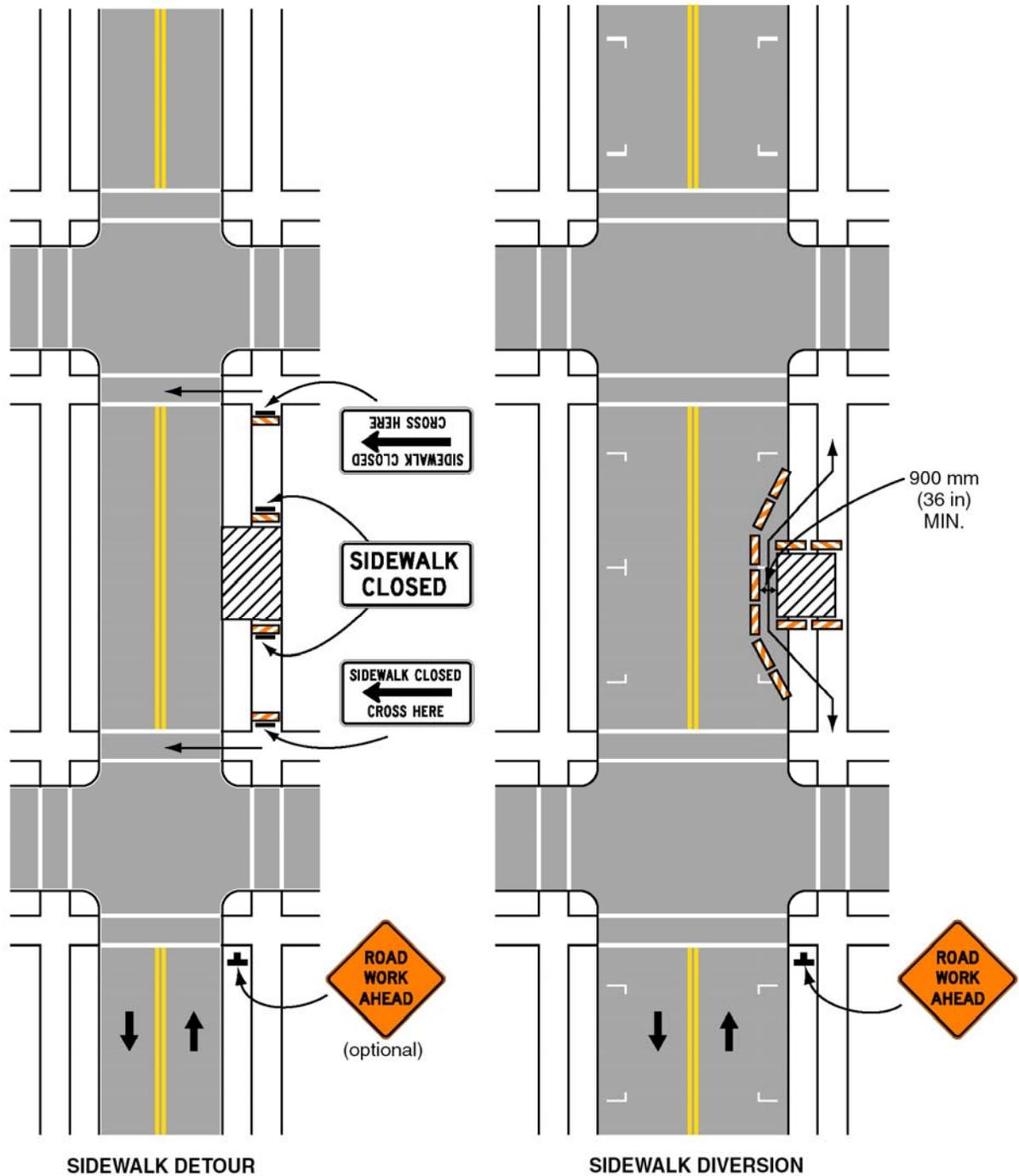
2. Where high speeds are anticipated, a temporary traffic barrier and, if necessary, a crash cushion should be used to separate the temporary sidewalks from vehicular traffic.
3. Audible information devices should be considered where midblock closings and changed crosswalk areas cause inadequate communication to be provided to pedestrians who have visual disabilities.

**Option:**

4. Street lighting may be considered.
  5. Only the TTC devices related to pedestrians are shown. Other devices, such as lane closure signing or ROAD NARROWS signs, may be used to control vehicular traffic.
  6. For nighttime closures, Type A Flashing warning lights may be used on barricades that support signs and close sidewalks.
  7. Type C Steady-Burn or Type D 360-degree Steady-Burn warning lights may be used on channelizing devices separating the temporary sidewalks from vehicular traffic flow.
  8. Signs, such as KEEP RIGHT (LEFT), may be placed along a temporary sidewalk to guide or direct pedestrians.
- 

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**Figure 6H-28. Sidewalk Detour or Diversion (TA-28)**



**Typical Application 28**

Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

## Notes for Figure 6H-29—Typical Application 29

### Crosswalk Closures and Pedestrian Detours

#### Standard:

1. When crosswalks or other pedestrian facilities are closed or relocated, temporary facilities shall be detectable and shall include accessibility features consistent with the features present in the existing pedestrian facility.
2. ~~Curb parking shall be prohibited for at least 15 m (50 ft) in advance of the midblock crosswalk.~~

#### Guidance:

2. Parking should be prohibited in advance of mid-block crosswalks. Mid-block crosswalks should be avoided, when possible. See Section 3B.17.
3. Audible information devices should be considered where midblock closings and changed crosswalk areas cause inadequate communication to be provided to pedestrians who have visual disabilities.
4. Pedestrian traffic signal displays controlling closed crosswalks should be covered or deactivated.

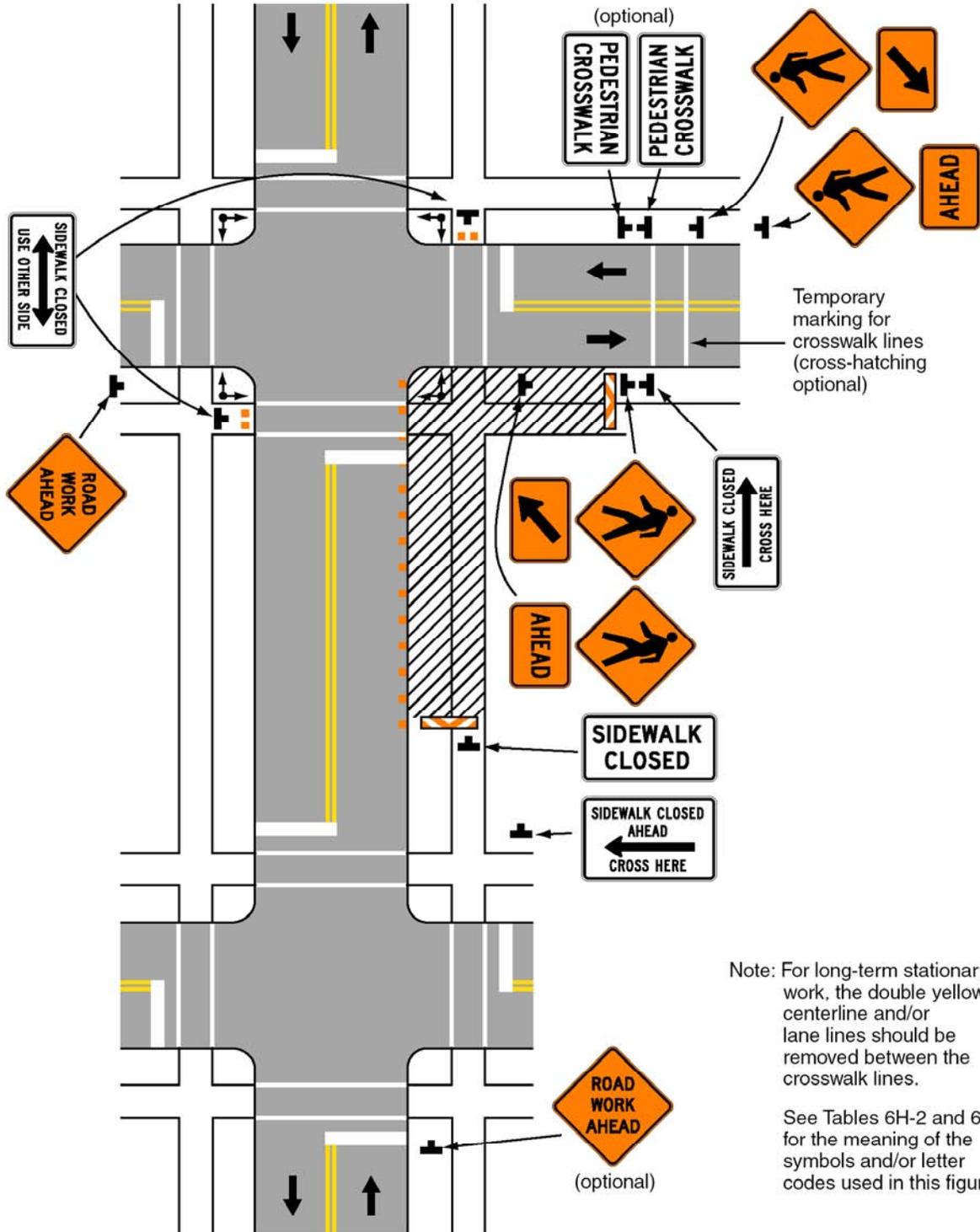
#### Option:

5. Street lighting may be considered.
6. Only the TTC devices related to pedestrians are shown. Other devices, such as lane closure signing or ROAD NARROWS signs, may be used to control vehicular traffic.
7. For nighttime closures, Type A Flashing warning lights may be used on barricades supporting signs and closing sidewalks.
8. Type C Steady-Burn warning lights may be used on channelizing devices separating the work space from vehicular traffic.
9. In order to maintain the systematic use of the fluorescent yellow-green background for pedestrian, bicycle, and school warning signs in a jurisdiction, the fluorescent yellow-green background for pedestrian, bicycle, and school warning signs may be used in TTC zones.

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**Figure 6H-29. Crosswalk Closures and Pedestrian Detours (TA-29)**



**Typical Application 29**

## Notes for Figure 6H-30—Typical Application 30

### Interior Lane Closure on Multi-lane Street

Guidance:

1. This information applies to low-speed, low-volume urban streets. Where speed or volume is higher, additional signing such as LEFT LANE CLOSED XX-~~m~~(FT) should be used between the signs shown.

Option:

2. The closure of the adjacent interior lane in the opposing direction may not be necessary, depending upon the activity being performed and the work space needed for the operation.
3. Shadow vehicles with a truck-mounted attenuator may be used.

Guidance:

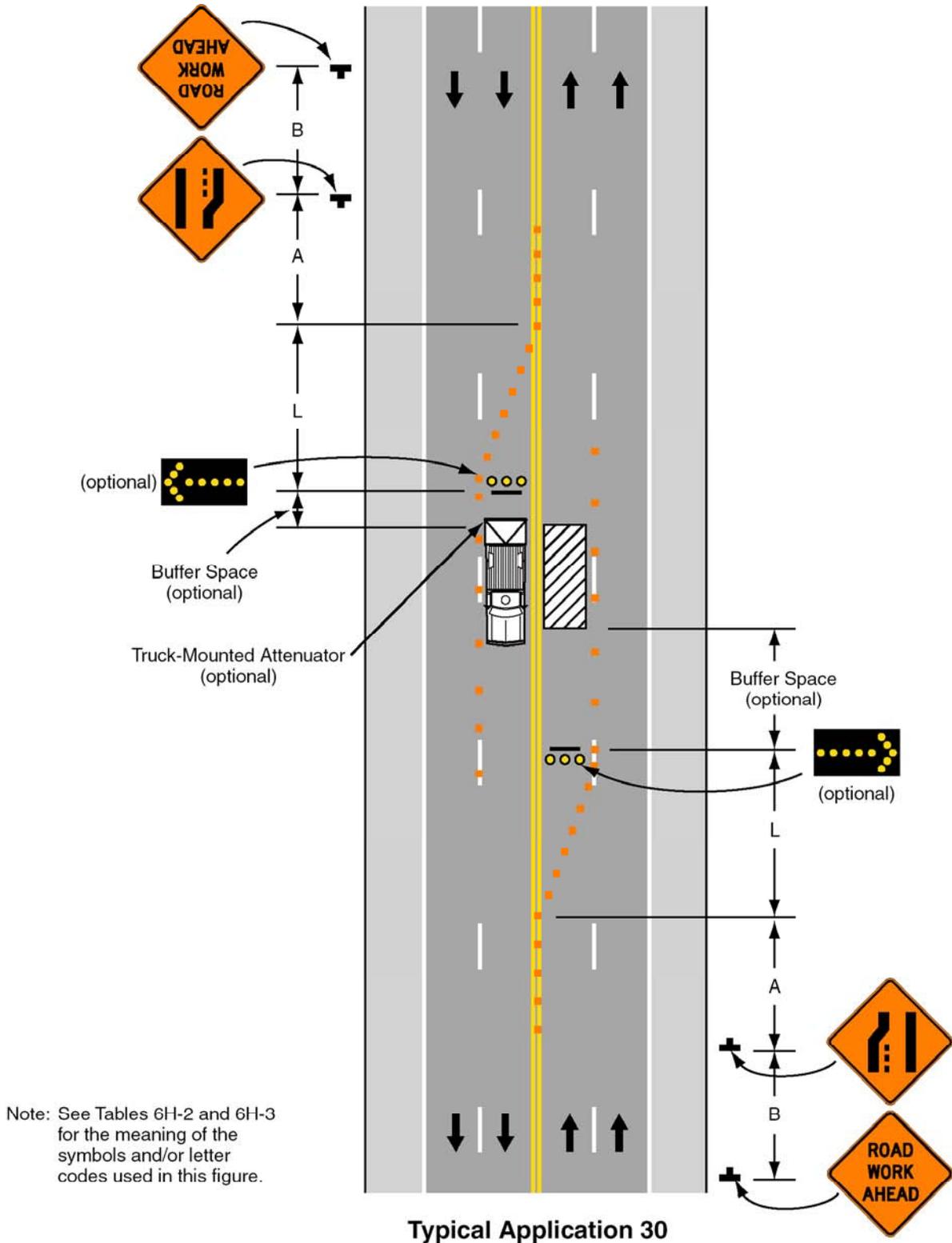
4. When a highway-rail grade crossing exists within or upstream of the transition area and it is anticipated that backups resulting from the lane closure might extend through the highway-rail grade crossing, the TTC zone should be extended so that the transition area precedes the highway-rail grade crossing.
5. Early coordination with the railroad company should occur before work starts.

Option:

6. The RIGHT (LEFT) LANE(S) CLOSED (W20-5) sign may be used instead of the Lane Reduction (W4-2) sign.
- 

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**Figure 6H-30. Interior Lane Closure on Multi-lane Street (TA-30)**



## Notes for Figure ~~6H-31~~ 6H-31(CA)—Typical Application 31

### Lane Closure on Street with Uneven Directional Volumes

**Standard:**

1. The illustrated information shall be used only when the vehicular traffic volume indicates that two lanes of vehicular traffic shall be maintained in the direction of travel for which one lane is closed.

**Option:**

2. The procedure may be used during a peak period of vehicular traffic and then changed to provide two lanes in the other direction for the other peak.

**Guidance:**

3. For high speeds, a LEFT LANE CLOSED XX-m (FT) sign should be added for vehicular traffic approaching the lane closure, as shown in Figure ~~6H-32~~ 6H-32(CA).
4. Conflicting pavement markings should be removed for long-term projects. For short-term and intermediate-term projects where this is not practical, the channelizing devices in the area where the pavement markings conflict should be placed at a maximum spacing of 0.1 S m (0.5 S ft) where S is the speed in km/h (mph). Temporary markings should be installed where needed. The spacing of channelizing devices should not exceed the maximum distances shown in Table 6F-102(CA). Refer to Section 6F.58 for spacing of channelizing devices.
5. If the lane shift has curves with recommended speeds of 50 km/h (30 mph) or less, Reverse Turn signs should be used.
6. Where the shifted section is long, a Reverse Curve sign should be used to show the initial shift and a second sign should be used to show the return to the normal alignment.
7. If the tangent distance along the temporary diversion is less than 180 m (600 ft), the Double Reverse Curve sign should be used at the location of the first Two Lane Reverse Curve sign. The second Two Lane Reverse Curve sign should be omitted. Use the Reverse Curve (W1-4) signs for both locations instead of the Double Reverse Curve or Two Lane Reverse Curve signs.

**Option:**

8. A longitudinal buffer space may be used in the activity area to separate opposing vehicular traffic.
9. An ALL LANES THRU supplemental plaque may be used to emphasize the point that all lanes shift and no lanes are closed. Use Reverse Curve (W1-4) sign instead of ALL LANES THRU Plaque.
10. A work vehicle or a shadow vehicle may be equipped with a truck-mounted attenuator.

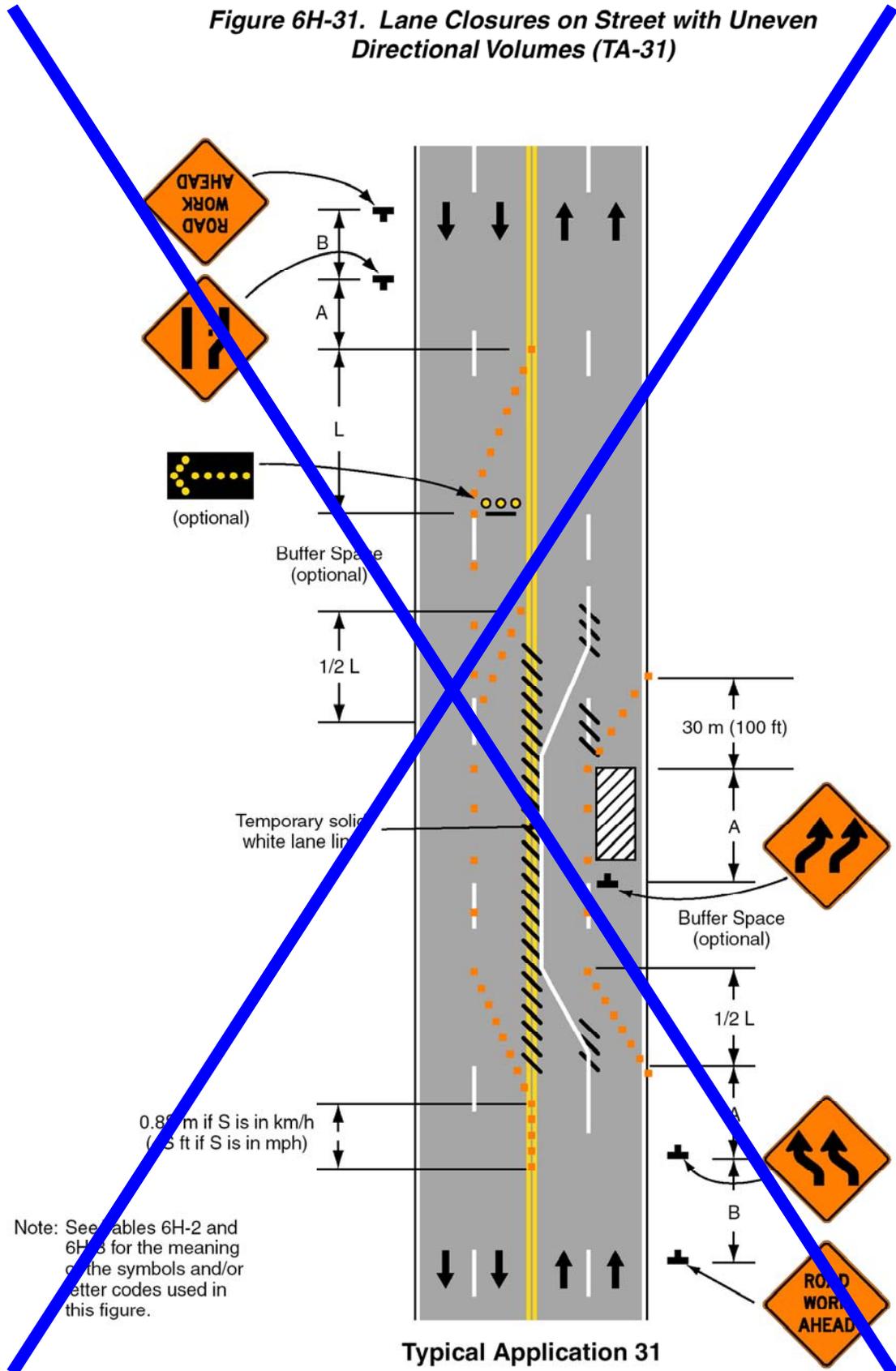
**Guidance:**

11. On State highways a spacing of 3 m (10 ft) should be used for taper and tangent sections.

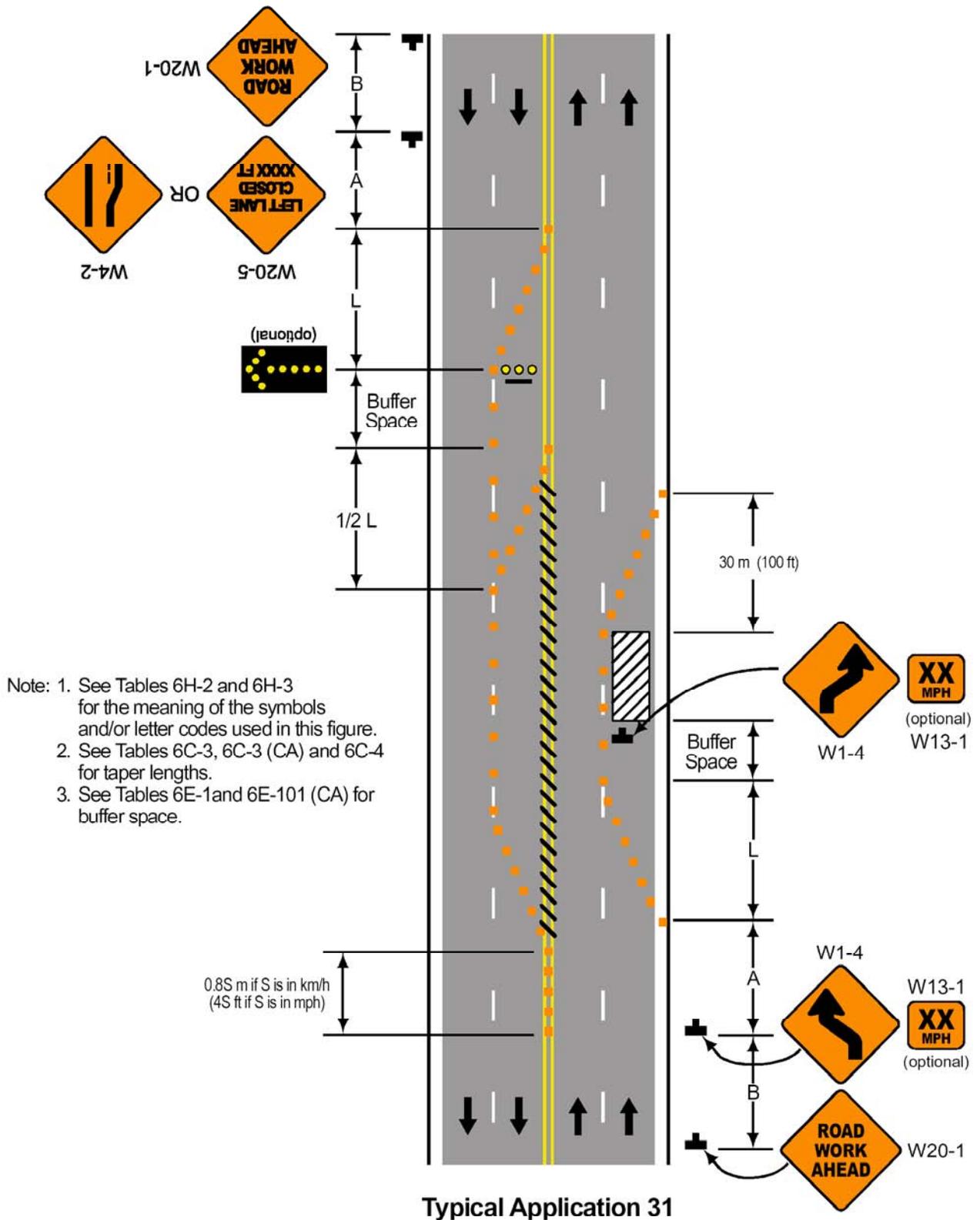
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**Figure 6H-31. Lane Closures on Street with Uneven Directional Volumes (TA-31)**



**Figure 6H-31 (CA). Lane Closures on Street with Uneven Directional Volumes (TA-31)**



**Notes for Figure ~~6H-32~~ 6H-32(CA)—Typical Application 32**

**Half Road Closure on Multi-lane, High-Speed Highway**

**Standard:**

- 1. Pavement markings no longer applicable shall be removed or obliterated as soon as practical. Except for intermediate-term and short-term situations, temporary markings shall be provided to clearly delineate the temporary travel path. For short-term and intermediate-term situations where it is not feasible to remove and restore pavement markings, channelization shall be made dominant by using a very close device spacing.**

**Guidance:**

2. When paved shoulders having a width of 2.4 m (8 ft) or more are closed, channelizing devices should be used to close the shoulder in advance of the merging taper to direct vehicular traffic to remain within the traveled way.
3. Where channelizing devices are used instead of pavement markings, the maximum spacing should be 0.1 S meters where S is the speed in km/h (0.5 S feet where S is the speed in mph). [The spacing of channelizing devices should not exceed the maximum distances shown in Table 6F-102\(CA\). Refer to Section 6F.58 for spacing of channelizing devices.](#)
4. If the tangent distance along the temporary diversion is more than 180 m (600 ft), a Reverse Curve sign, left first, should be used instead of the Double Reverse Curve sign, and a second Reverse Curve sign, right first, should be placed in advance of the second reverse curve back to the original alignment.

**Option:**

5. Warning lights may be used to supplement channelizing devices at night.

**Guidance:**

6. When a highway-rail grade crossing exists within or upstream of the merging taper and it is anticipated that backups resulting from the lane closure might extend through the highway-rail grade crossing, the TTC zone should be extended so that the merging taper precedes the highway-rail grade crossing.
7. When a highway-rail grade crossing exists within the activity area, provisions should be made to provide road users operating on the left side of the normal centerline with comparable warning devices as supplied for road users operating on the right side of the normal centerline.
8. When a highway-rail grade crossing exists within the activity area, early coordination with the railroad company should occur before work starts.

**Option:**

9. When a highway-rail grade crossing exists within the activity area, a flagger may be used at the highway-rail grade crossing to minimize the probability that vehicles are stopped within 4.6 m (15 ft) of the highway-rail grade crossing, measured from both sides of the outside rails.
10. A truck-mounted attenuator may be used on the work vehicle and/or the shadow vehicle.

**Guidance:**

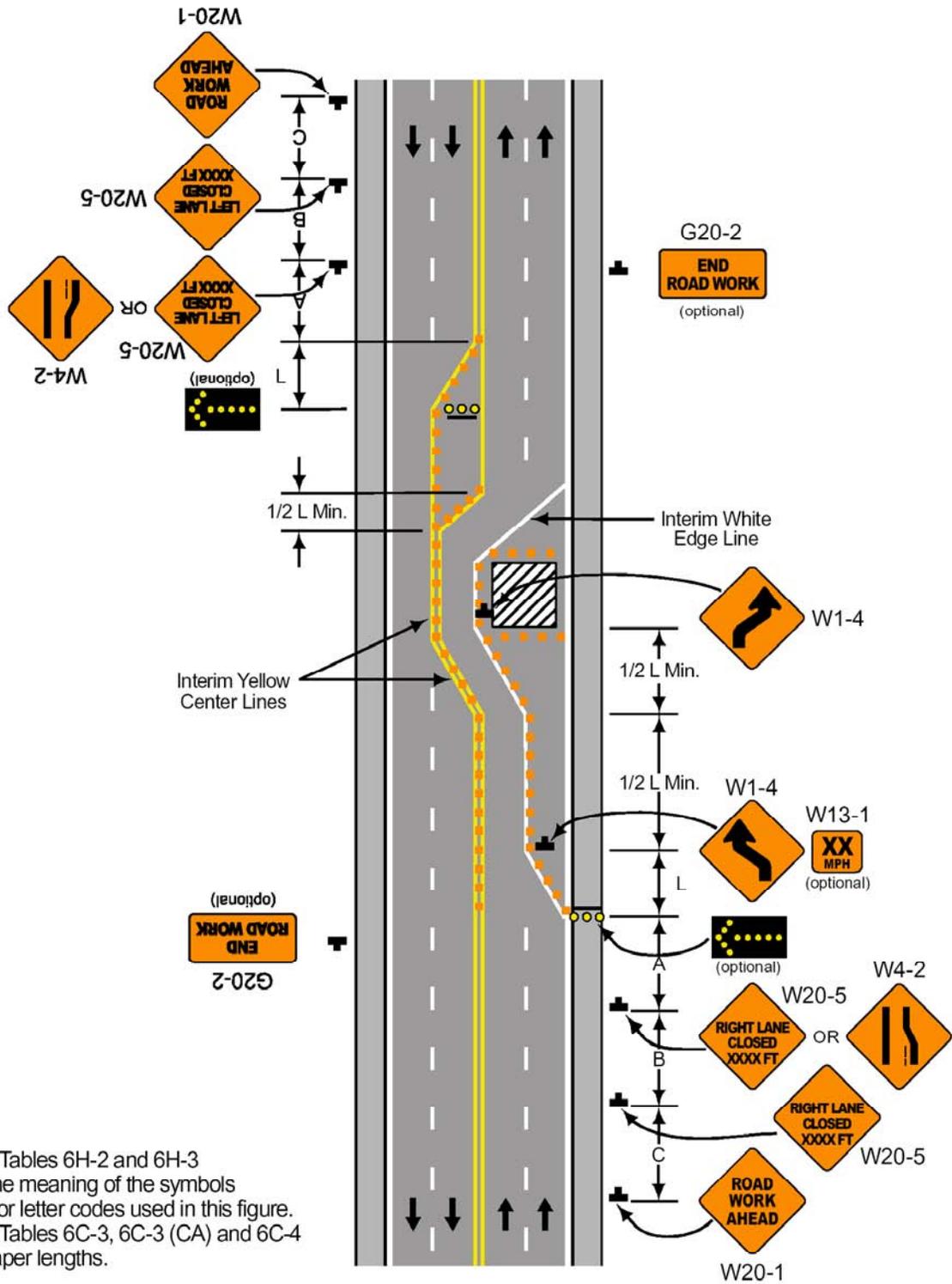
11. [On State highways a spacing of 3 m \(10 ft\) should be used for taper and tangent sections.](#)

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**Figure 6H-32 (CA). Half Road Closure on Multilane, High-Speed Highway (TA-32)**



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 6C-3, 6C-3 (CA) and 6C-4 for taper lengths.

**Typical Application 32**

### Notes for Figure 6H-33—Typical Application 33

#### Stationary Lane Closure on Divided Highway

**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.**
- 2. When a side road intersects the highway within the TTC zone, additional TTC devices shall be placed as needed.**

**Guidance:**

3. When paved shoulders having a width of 2.4 m (8 ft) or more are closed, channelizing devices should be used to close the shoulder in advance of the merging taper to direct vehicular traffic to remain within the traveled way.

**Option:**

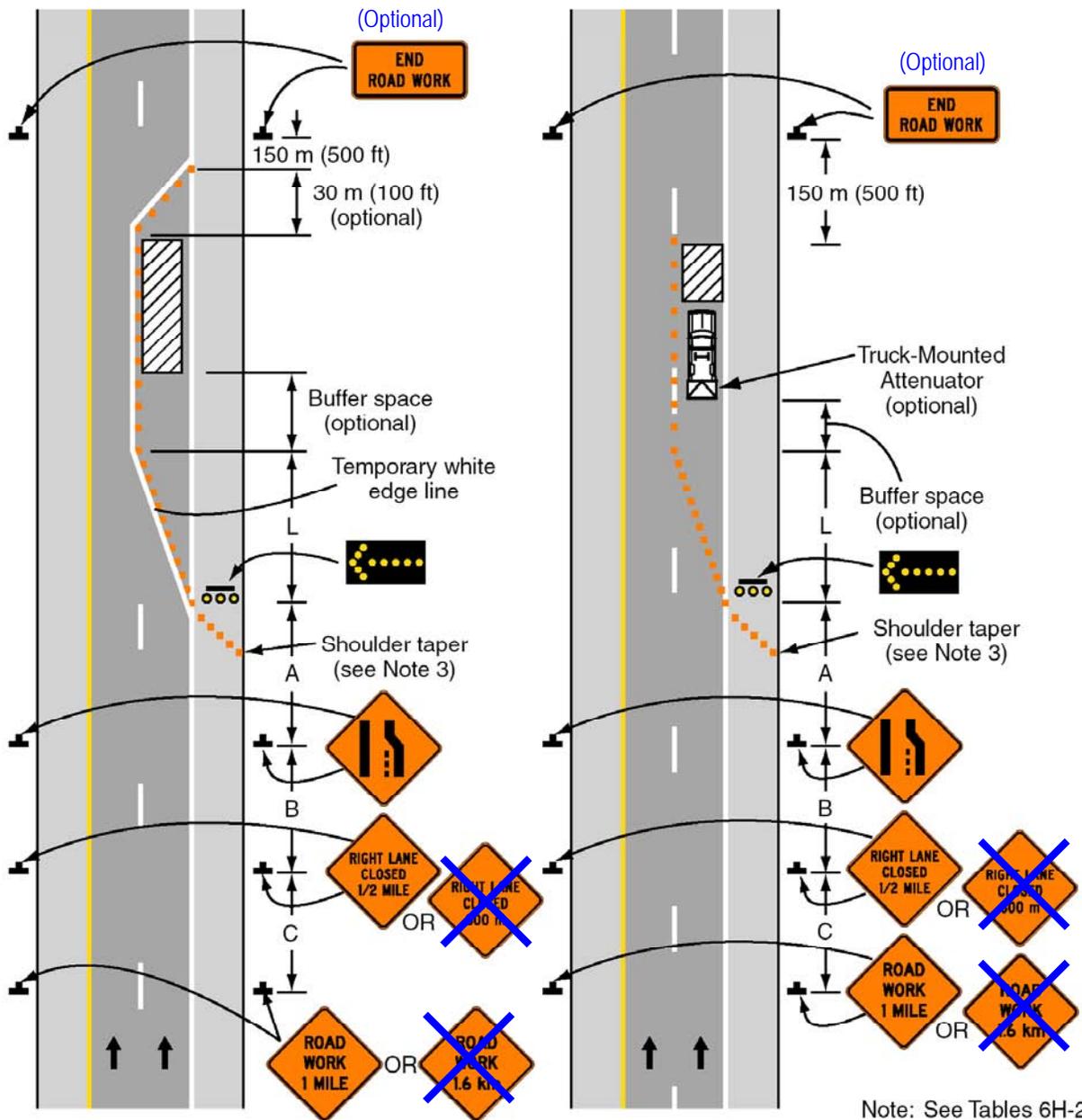
4. A truck-mounted attenuator may be used on the work vehicle and/or shadow vehicle.

**Support:**

5. Where conditions permit, restricting all vehicles, equipment, workers, and their activities to one side of the roadway might be advantageous.
- 

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**Figure 6H-33. Stationary Lane Closure on Divided Highway (TA-33)**



Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

**Typical Application 33**

## Notes for Figure 6H-34—Typical Application 34

### Lane Closure with 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 start of the merging taper to the far 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. Where temporary traffic barriers are installed, the ends of the barrier shall be treated in accordance with the provisions of Section 6F.81
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. 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 nonwork periods or peak-period vehicular traffic conditions, as appropriate.
7. 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.

**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 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 panel, if used, shall be placed at the end of the shoulder taper and shall display the caution mode.

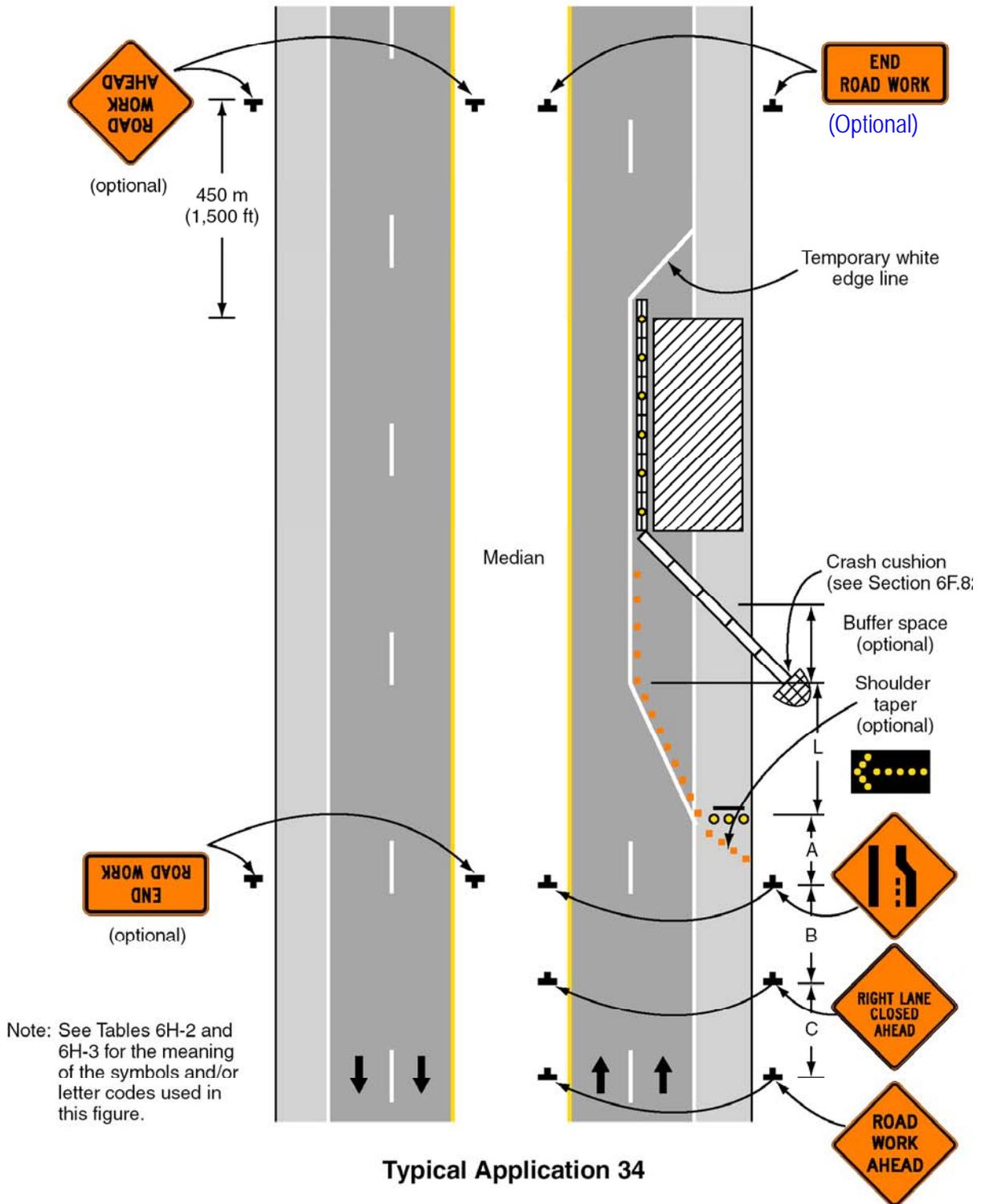
Guidance:

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 movablebarrier 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.

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



## Notes for Figure 6H-35—Typical Application 35

### Mobile Operation on Multi-lane Road

#### Standard:

1. Arrow panels shall, as a minimum, be Type B, with a size of 1500 x 750 mm (60 x 30 in). For State highways, the arrow panels shall, as a minimum, be type B (or type II), with a size of 1800 x 900 mm (72 x 36 in). Refer to Department of Transportation's Standard Specifications Section 12-3.03 for minimum size and type of arrow panels cited above. See Section 1A.11 for information regarding this publication.

#### Guidance:

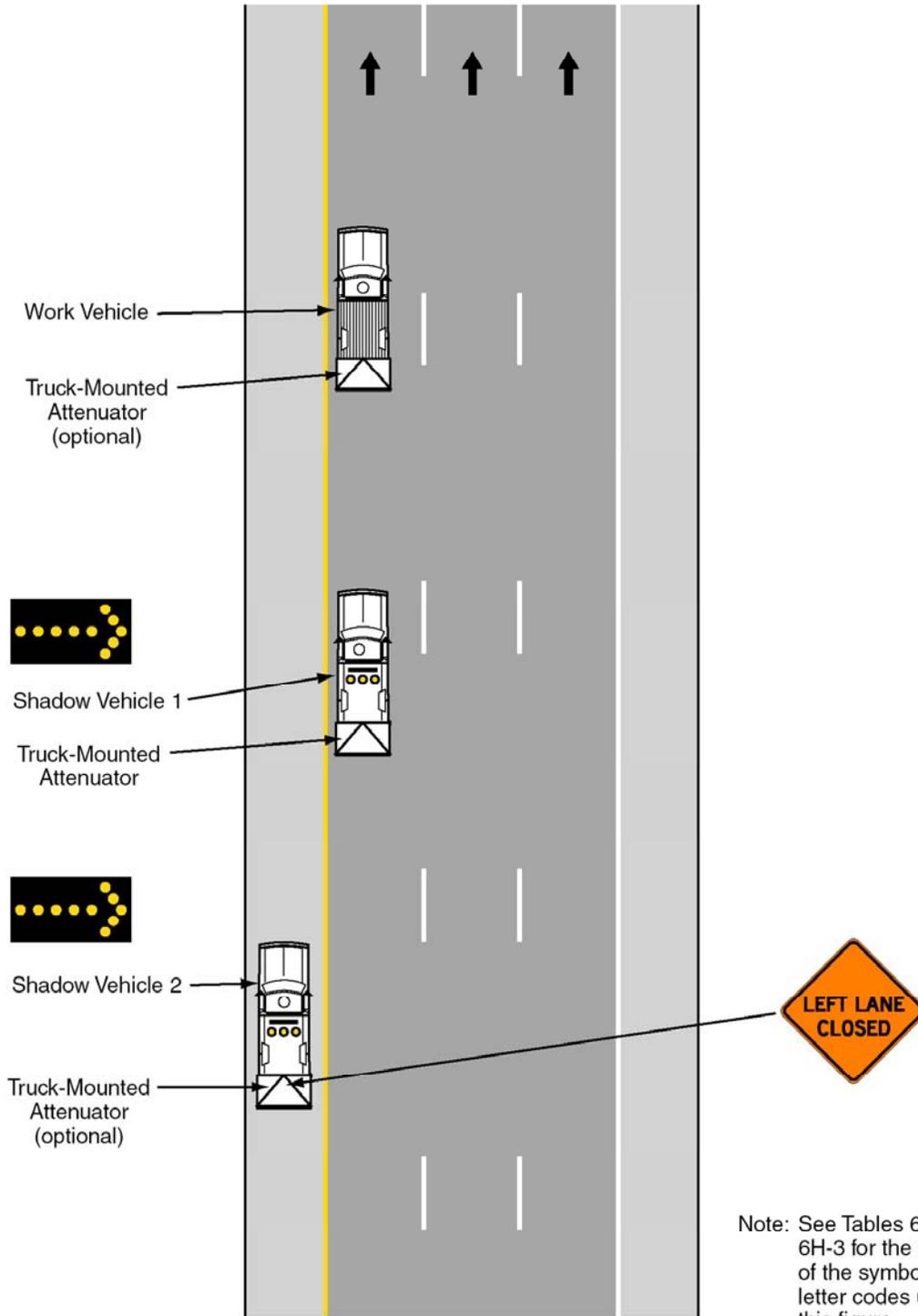
2. Vehicles used for these operations should be made highly visible with appropriate equipment, such as: high-intensity rotating, flashing, oscillating, or strobe lights, flags, signs, or arrow panels.
3. Shadow Vehicle 1 should be equipped with an arrow panel and truck-mounted attenuator.
4. Shadow Vehicle 2 should be equipped with an arrow panel. An appropriate lane closure sign should be placed on Shadow Vehicle 2 so as not to obscure the arrow panel.
5. Shadow Vehicle 2 should travel at a varying distance from the work operation so as to provide adequate sight distance for vehicular traffic approaching from the rear.
6. The spacing between the work vehicles and the shadow vehicles, and between each shadow vehicle should be minimized to deter road users from driving in between.
7. Work should normally be accomplished during off-peak hours.
8. When the work vehicle occupies an interior lane (a lane other than the far right or far left) of a directional roadway having a right shoulder 3 m (10 ft) or more in width, Shadow Vehicle 2 should drive the right shoulder with a sign indicating that work is taking place in the interior lane.

#### Option:

9. A truck-mounted attenuator may be used on Shadow Vehicle 2.
  10. On high-speed roadways, a third shadow vehicle (not shown) may be used with Shadow Vehicle 1 in the closed lane, Shadow Vehicle 2 straddling the edge line, and Shadow Vehicle 3 on the shoulder.
  11. Where adequate shoulder width is not available, Shadow Vehicle 3 may drive partially in the lane.
- 

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**Figure 6H-35. Mobile Operation on Multi-lane Road (TA-35)**



Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

**Typical Application 35**

## Notes for Figure 6H-36—Typical Application 36

### Lane Shift on Freeway

#### Guidance:

1. The lane shift should be used when the work space extends into either the right or left lane of a divided highway and it is not practical, for capacity reasons, to reduce the number of available lanes.
2. When a lane shift is accomplished by using (1) geometry that meets the design speed at which the permanent highway was designed, (2) full normal cross-section (full lane width and full shoulders), and (3) complete pavement markings, then only the initial general work-zone warning sign is required.
3. When the conditions in Note 2 are not met, the information shown in the typical application should be employed and all the following notes apply.

#### Standard:

4. **Where temporary traffic barriers are installed, the ends of the barrier shall be treated in accordance with the provisions of Section 6F.81.**
5. **A warning sign shall be used to show the changed alignment.**

#### Guidance:

6. Where the shifted section is longer than 180 m (600 ft), one set of Reverse Curve signs should be used to show the initial shift and a second set should be used to show the return to the normal alignment. If the tangent distance along the temporary diversion is less than 180 m (600 ft), the Double Reverse Curve sign should be used instead of the first Reverse Curve sign. The second Reverse Curve sign should be omitted. [Use the Reverse Curve \(W1-4\) signs for both locations instead of the Double Reverse Curve \(W24-1\) sign.](#)
7. If a STAY IN LANE sign is used, then solid white lane lines should be used.

#### Standard:

8. **The minimum width of the shoulder lane shall be 3 m (10 ft).**
9. **For long-term stationary work, existing conflicting pavement markings shall be removed and temporary markings shall be installed before traffic patterns are changed.**

#### Option:

10. For short-term stationary work, lanes may be delineated by channelizing devices or removable pavement markings instead of temporary pavement markings.
11. ~~Three Lane Reverse Curve signs may be used in place of the Reverse Curve signs.~~ ALL LANES THRU supplemental plaques may be used to emphasize the point that all lanes shift and no lanes are closed. [Use the Reverse Curve \(W1-4\) signs instead of the Reverse Curve \(W1-4a & W1-4b\) signs which show the number of lanes or ALL LANES THRU Plaque.](#)
12. If the shoulder cannot adequately accommodate trucks, trucks may be directed to use the travel lanes.
13. The barrier shown in this typical application is one method that may be used to close a lane for a longterm project.

#### Guidance:

14. The use of a barrier should be based on engineering judgment.

#### Option:

15. 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.
16. [Detail 11 \(see Figure 3A-102\(CA\)\) may be used instead of the temporary solid white lane line, which is shown in Figure 6H-36.](#)



### Notes for Figure 6H-37—Typical Application 37

#### Double Lane Closure on Freeway

**Guidance:**

1. Ordinarily, the preferred position for the second arrow panel is in the closed exterior lane at the beginning of the second merging taper. However, the second arrow panel should be placed in the closed interior lane at the end of the second merging taper in the following situations:
  - a. When a shadow vehicle is used in the interior closed lane, and the second arrow panel is mounted on the shadow vehicle;
  - b. If alignment or other conditions create any confusion as to which lane is closed by the second arrow panel; and
  - c. When the first arrow panel is placed in the closed exterior lane at the end of the first merging taper (the alternative position when the shoulder is narrow).

**Option:**

2. Flashing warning lights and/or flags may be used to call attention to the initial warning signs.
3. A truck-mounted attenuator may be used on the shadow vehicle.
4. If a paved shoulder having a minimum width of 3 m (10 ft) and sufficient strength is available, the left and adjacent interior lanes may be closed and vehicular traffic carried around the work space on the right lane and a right shoulder.
5. When a shoulder lane is used that cannot adequately accommodate trucks, trucks may be directed to use the normal travel lanes.

**Standard:**

This typical application is deleted for application and shall not be used in California. Department of Transportation's Standard Plan T10 shall be used instead.

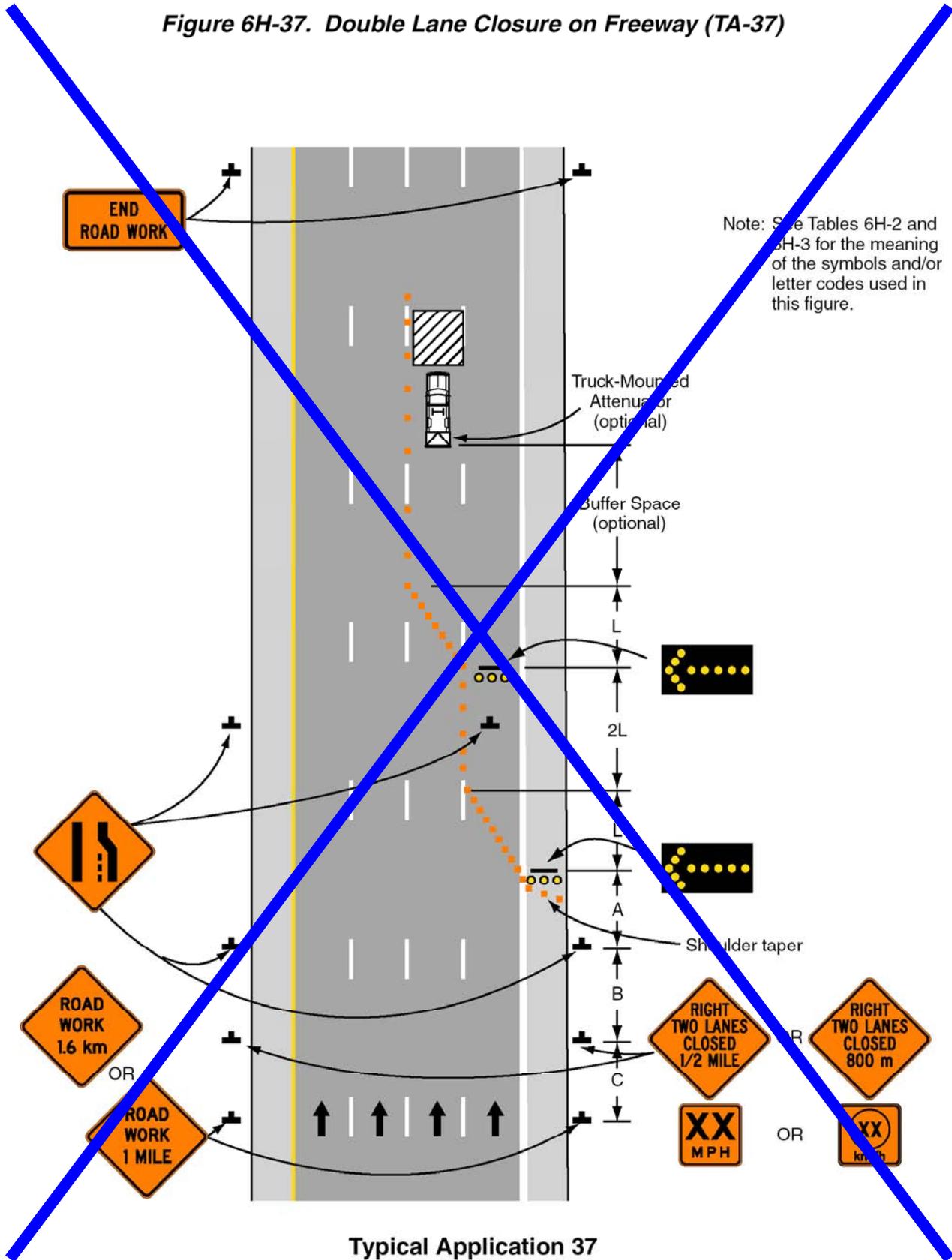
**Support:**

See Section 1A.11 for information regarding this publication.

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Figure 6H-37. Double Lane Closure on Freeway (TA-37)



## Notes for Figure 6H-38—Typical Application 38

### Interior Lane Closure on Freeway

#### Guidance:

1. For a long-term closure, a barrier should be used to provide additional safety to the operation in the closed interior lane. A buffer space should be used at the upstream end of the closed interior lane.
2. The first arrow panel displaying a right arrow should be on the left shoulder at the beginning of the taper. The arrow panel displaying a double arrow should be centered in the closed interior lane and placed at the downstream end of the shifting taper.
3. The placement of signs should not obstruct or obscure arrow panels.
4. For long-term use, the dashed lane lines should be made solid white in the two-lane section.

#### Option:

5. As the arrow panel with a double arrow displayed is key, the arrow panel closing the exterior lane may be moved or omitted if the alignment is such that the two panels create confusion.
6. As an alternative to initially closing the left lane, as shown in the typical application, the right lane may be closed in advance of the interior lane closure with appropriate channelization and signs.
7. A short, single row of channelizing devices in advance of the vehicular traffic split to restrict vehicular traffic to their respective lanes may be added.
8. DO NOT PASS signs may be used.
9. If a paved shoulder having a minimum width of 3 m (10 ft) and sufficient strength is available, the left and center lanes may be closed and motor vehicle traffic carried around the work space on the right lane and a right shoulder.
10. When a shoulder lane is used that cannot adequately accommodate trucks, trucks may be directed to use the normal travel lanes.

#### Standard:

This typical application is deleted for application and shall not be used on freeways in California. Department of Transportation's Standard Plan T-16 for moving lane closures shall be used instead.

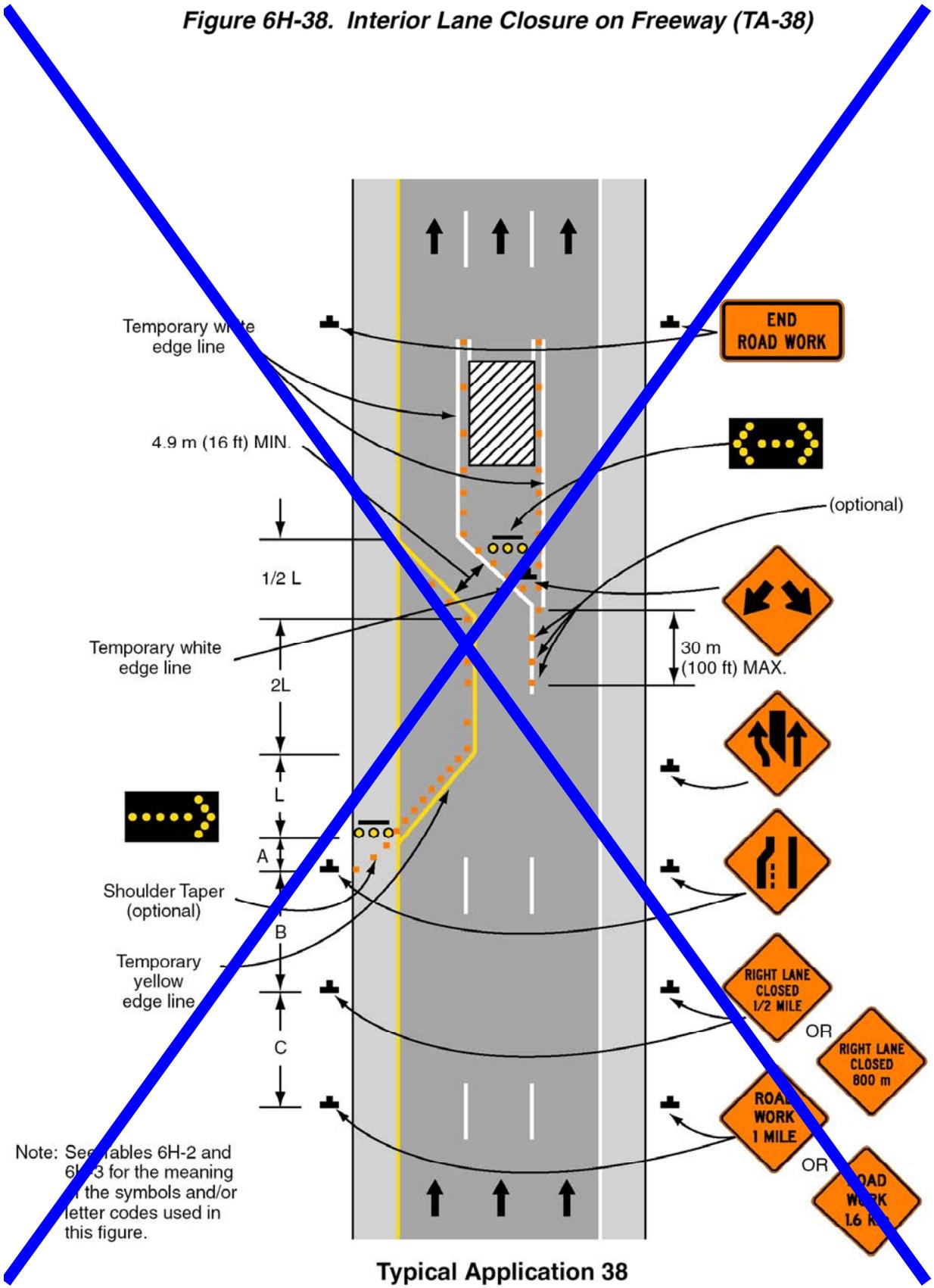
#### Support:

See Section 1A.11 for information regarding this publication.

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**Figure 6H-38. Interior Lane Closure on Freeway (TA-38)**



**Typical Application 38**

## Notes for Figure 6H-39—Typical Application 39

### Median Crossover on Freeway

**Standard:**

1. Channelizing devices or temporary traffic barriers shall be used to separate opposing vehicular traffic.

**Guidance:**

2. For long-term work on high-speed, high-volume highways, consideration should be given to using a temporary traffic barrier to separate opposing vehicular traffic.

**Option:**

3. When a temporary traffic barrier is used to separate opposing vehicular traffic, the Two-Way Traffic, DO NOT PASS, KEEP RIGHT, and DO NOT ENTER signs may be eliminated.
4. The alignment of the crossover may be designed as a reverse curve.

**Guidance:**

5. When the crossover follows a curved alignment, the design criteria contained in the AASHTO "Policy on the Geometric Design of Highways and Streets" should be used (see Section 1A.11).
6. When channelizing devices have the potential of leading vehicular traffic out of the intended traffic space, the channelizing devices should be extended a distance in meters (feet) of 0.4 times the speed limit in km/h (2 times the speed limit in mph) beyond the end of the transition area as depicted.
7. Where channelizing devices are used, the Two-Way Traffic signs should be repeated every 1.6 km (1 mi).

**Option:**

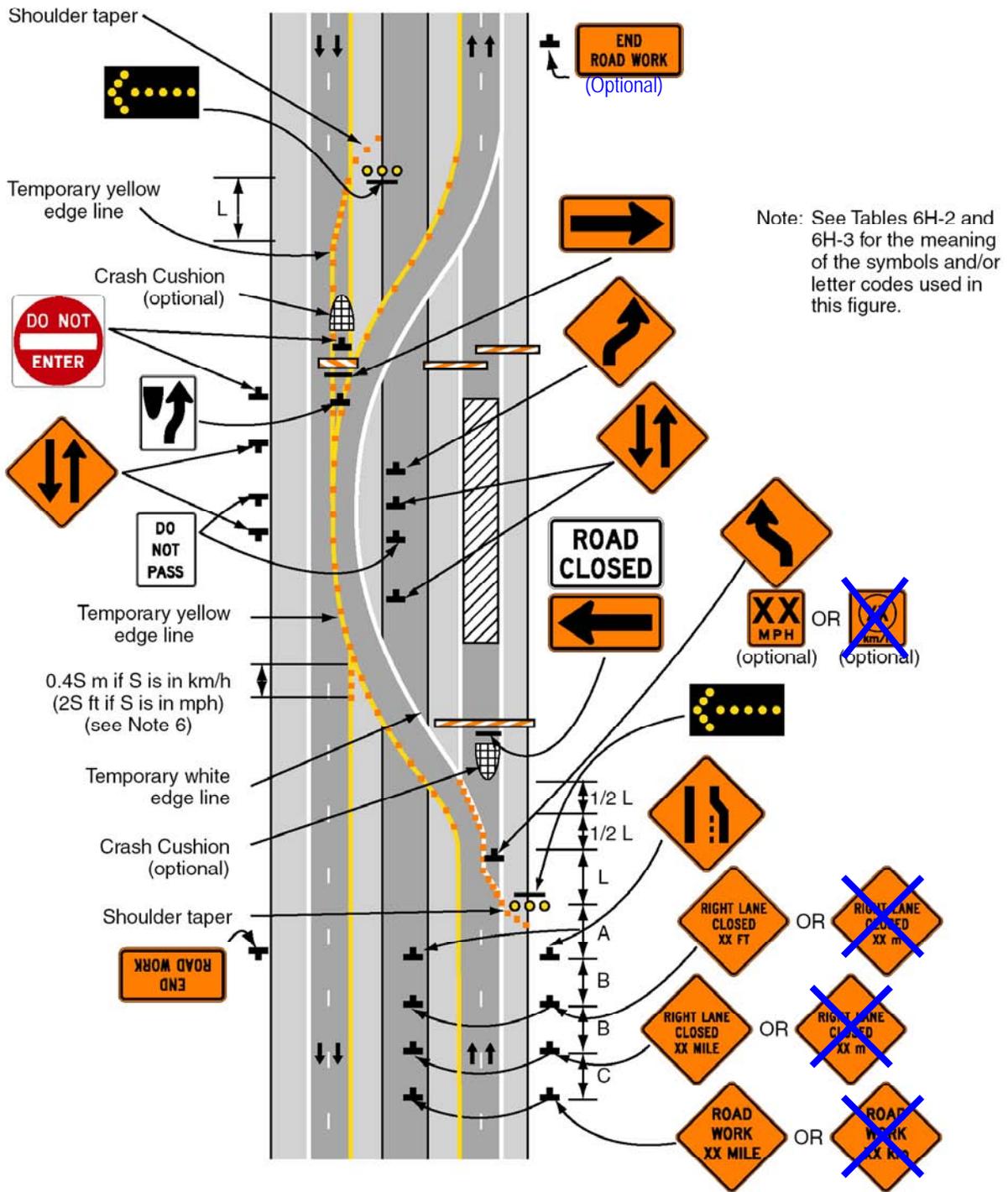
8. NEXT X ~~km~~ (MILES) Supplemental Distance plaques may be used with the Two-Way Traffic signs, where X is the distance to the end of the two-way section.

**Support:**

9. When the distance is sufficiently short that road users entering the section can see the far end of the section, they are less likely to forget that there is opposing vehicular traffic.
  10. The sign legends for the four pairs of signs approaching the lane closure for the noncrossover direction of travel are not shown. They are similar to the series shown for the crossover direction, except that the left lane is closed.
- 

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**Figure 6H-39. Median Crossover on Freeway (TA-39)**



**Typical Application 39**

## Notes for Figure 6H-40—Typical Application 40

### Median Crossover for Entrance Ramp

Guidance:

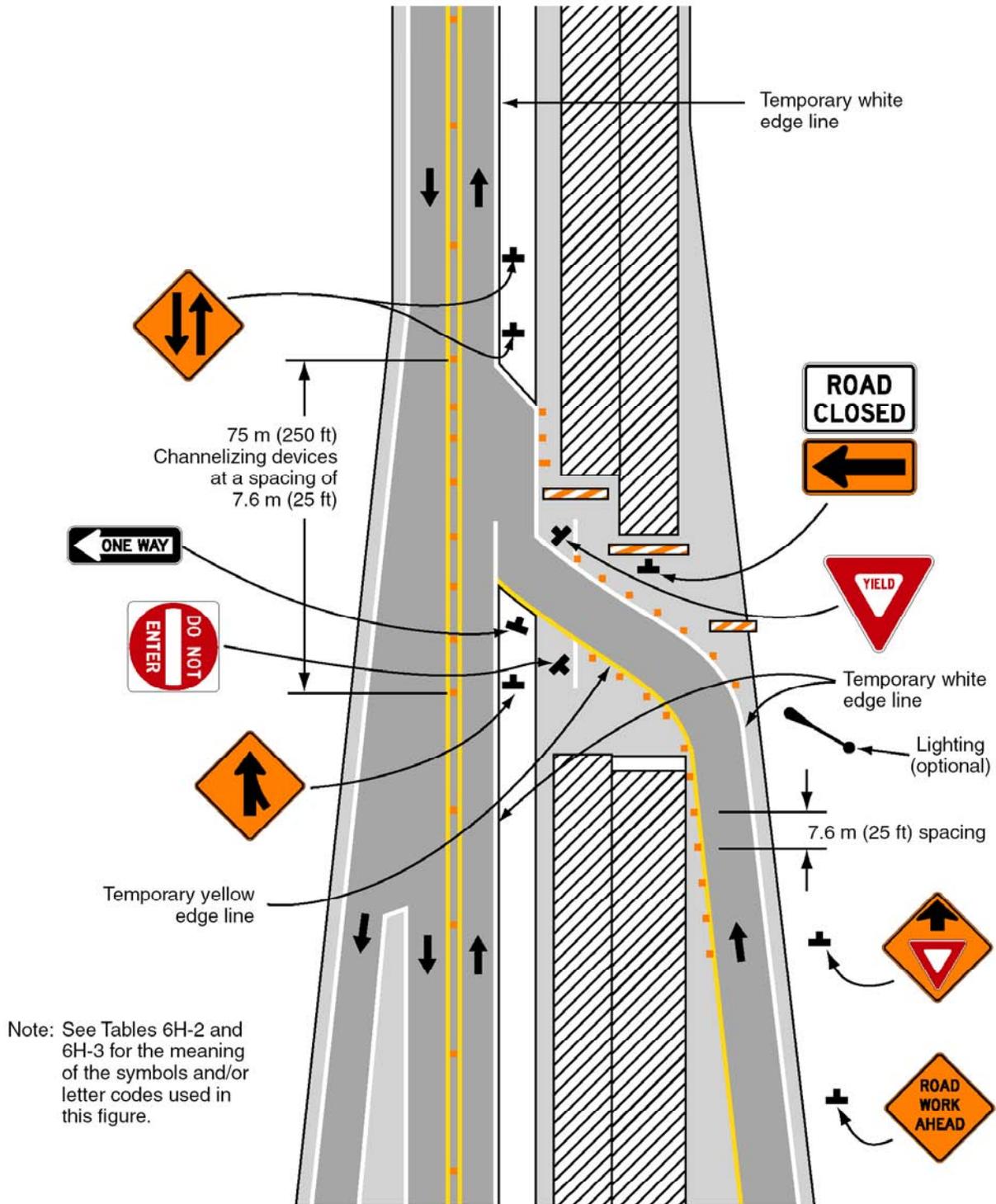
1. The typical application illustrated should be used for carrying an entrance ramp across a closed directional roadway of a divided highway.
2. A temporary acceleration lane should be used to facilitate merging.
3. When used, the YIELD or STOP sign should be located far enough forward to provide adequate sight distance of oncoming mainline vehicular traffic to select a reasonably safe gap. If needed, YIELD or STOP lines should be installed across the ramp to indicate the point at which road users should YIELD or STOP. Also, a longer acceleration lane should be provided beyond the sign to reduce the gap size needed.

Option:

4. If vehicular traffic conditions allow, the ramp may be closed.
  5. A broken edge line may be carried across the temporary entrance ramp to assist in defining the through vehicular traffic lane.
  6. When a temporary traffic barrier is used to separate opposing vehicular traffic, the Two-Way Traffic signs and the DO NOT ENTER signs may be eliminated.
- 

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**Figure 6H-40. Median Crossover for Entrance Ramp (TA-40)**



**Typical Application 40**

## Notes for Figure 6H-41—Typical Application 41

### Median Crossover for Exit Ramp

#### Guidance:

1. This typical application should be used for carrying an exit ramp across a closed directional roadway of a divided highway. The design criteria contained in the AASHTO "Policy on the Geometric Design of Highways and Streets" (see Section 1A.11) should be used for determining the curved alignment.
2. The guide signs should indicate that the ramp is open, and where the temporary ramp is located. Conversely, if the ramp is closed, guide signs should indicate that the ramp is closed.
3. When the exit is closed, a black on orange EXIT CLOSED panel should be placed diagonally across the interchange/intersection guide signs.
4. In the situation (not shown) where channelizing devices are placed along the mainline roadway, the devices' spacing should be reduced in the vicinity of the off ramp to emphasize the opening at the ramp itself. Channelizing devices and/or temporary pavement markings should be placed on both sides of the temporary ramp where it crosses the median and the closed roadway.
5. Advance guide signs providing information related to the temporary exit should be relocated or duplicated adjacent to the temporary roadway.

#### Standard:

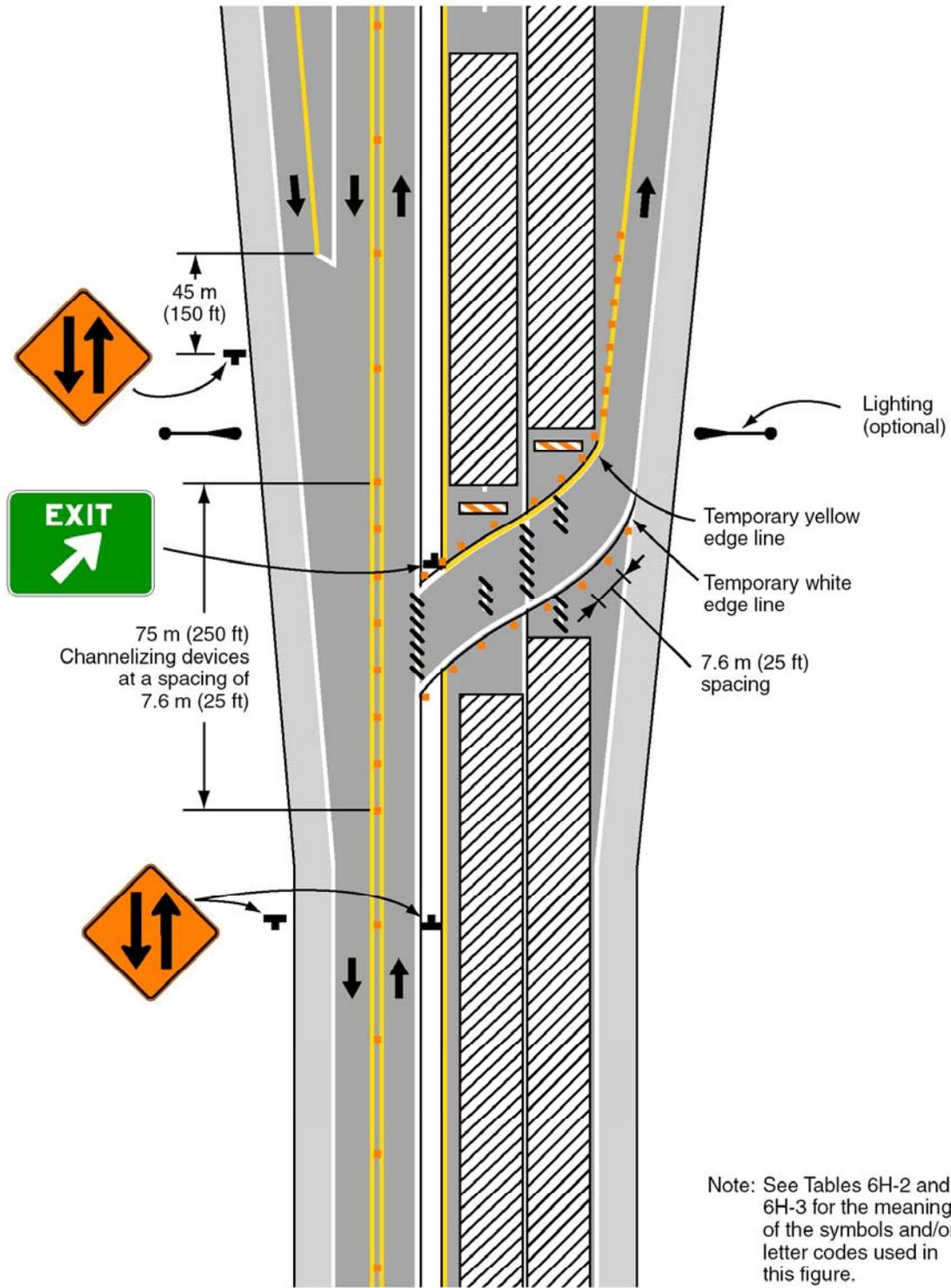
6. **A temporary EXIT sign shall be located in the temporary gore. For better visibility, it shall be mounted a minimum of 2.1 m (7 ft) from the pavement surface to the bottom of the sign.**

#### Option:

7. Guide signs referring to the exit may need to be relocated to the median.
  8. The temporary EXIT sign placed in the temporary gore may be either black on orange or white on green.
  9. In some instances, a temporary deceleration lane may be useful in facilitating the exiting maneuver.
  10. When a temporary traffic barrier is used to separate opposing vehicular traffic, the Two-Way Traffic signs may be omitted.
- 

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**Figure 6H-41. Median Crossover for Exit Ramp (TA-41)**



Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

**Typical Application 41**

## Notes for Figure 6H-42—Typical Application 42

### Work in Vicinity of Exit Ramp

**Guidance:**

1. The guide signs should indicate that the ramp is open, and where the temporary ramp is located. However, if the ramp is closed, guide signs should indicate that the ramp is closed.
2. When the exit ramp is closed, a black on orange EXIT CLOSED panel should be placed diagonally across the interchange/intersection guide signs.
3. The design criteria contained in the AASHTO "Policy on the Geometric Design of Highways and Streets" should be used for determining the alignment (see Section 1A.11).

**Standard:**

4. **A temporary EXIT sign shall be located in the temporary gore. For better visibility, it shall be mounted a minimum of 2.1 m (7 ft) from the pavement surface to the bottom of the sign.**

**Option:**

5. An alternative procedure that may be used is to channelize exiting vehicular traffic onto the right shoulder and close the lane as necessary.

**Option:**

The Department of Transportation's Standard Plan T10 may be used instead of this typical application.

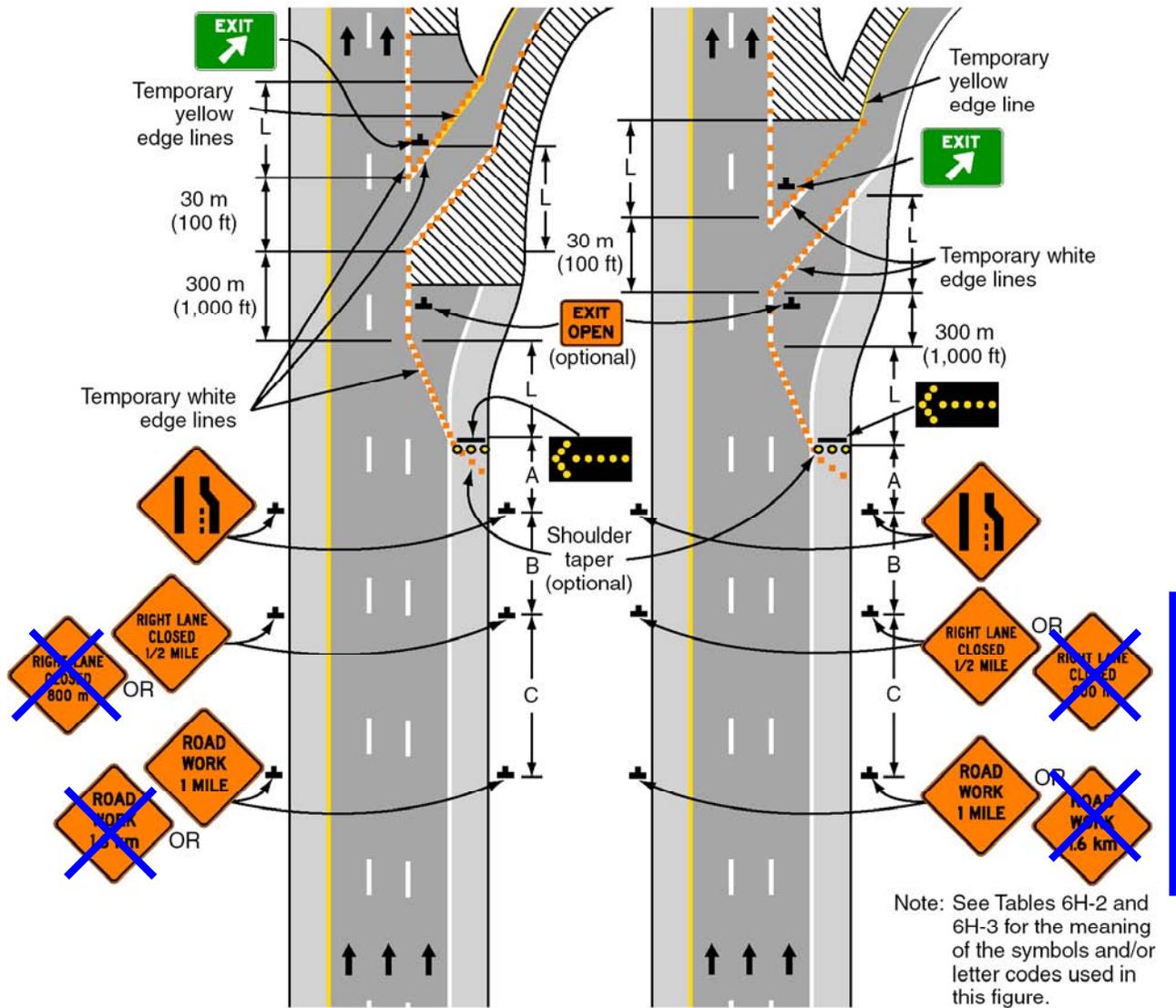
**Support:**

See Section 1A.11 for information regarding this publication.

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**Figure 6H-42. Work in Vicinity of Exit Ramp (TA-42)**



**Typical Application 42**

## Notes for Figure 6H-43—Typical Application 43

### Partial Exit Ramp Closure

Guidance:

1. Truck off-tracking should be considered when determining whether the minimum lane width of 3 m (10 ft) is adequate (see Section 6G.07).

Standard:

2. The RAMP NARROWS (W5-4) sign shall not be used in California. The ROAD NARROWS (W5-1) sign or NARROW LANE(S) (C12(CA)) sign, as appropriate, shall be used instead. See Sections 2C.15 and 6F.103(CA).

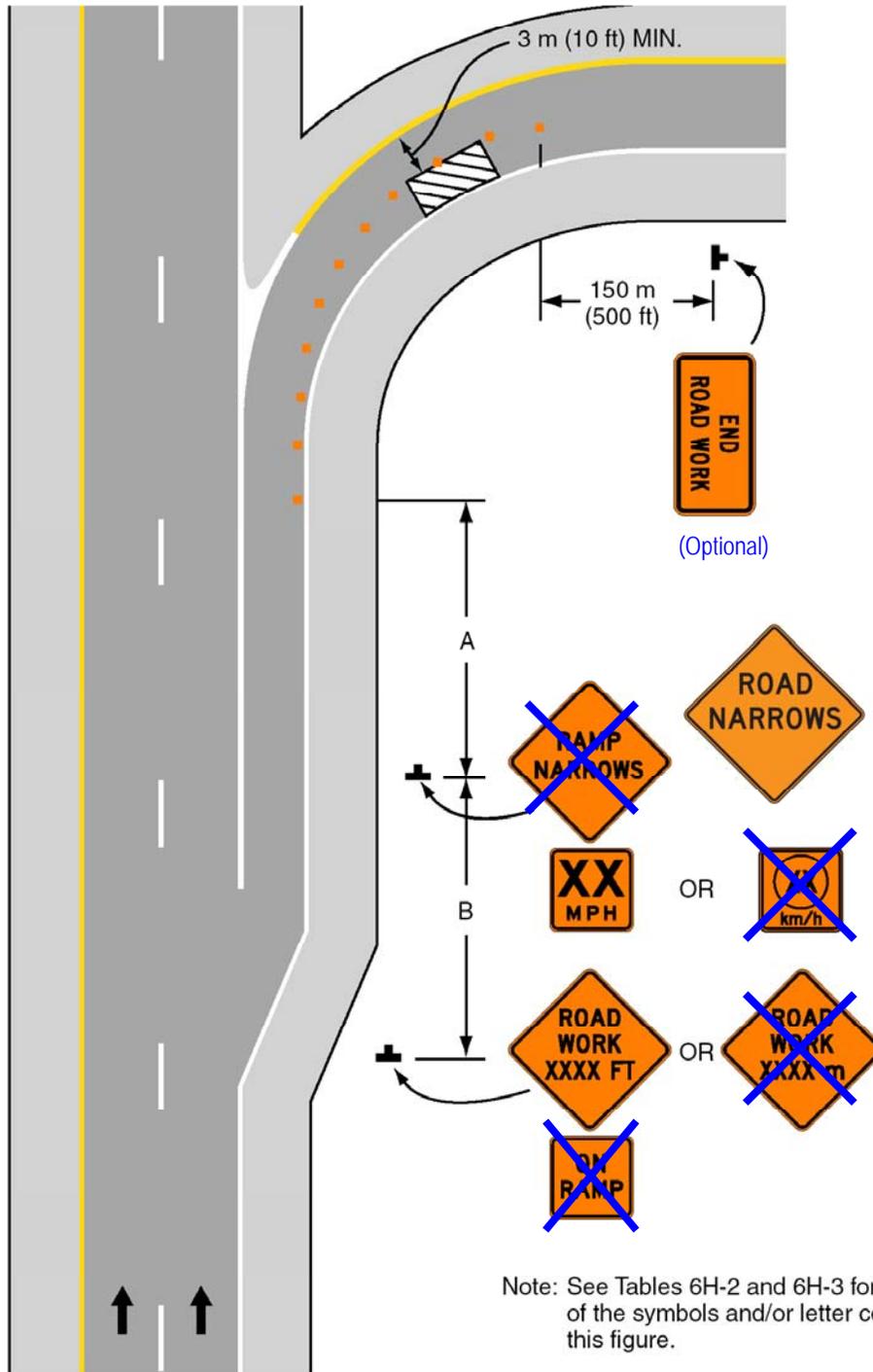
Guidance:

3. For planned partial ramp closure, consideration should be given to closing the entire exit ramp. Refer to Department of Transportation's Standard Plan T14. See Section 1A.11 for information regarding this publication.

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**Figure 6H-43. Partial Exit Ramp Closure (TA-43)**



**Typical Application 43**

## Notes for Figure 6H-44—Typical Application 44

### Work in Vicinity of Entrance Ramp

Guidance:

1. An acceleration lane of sufficient length should be provided whenever possible as shown on the left diagram.

**Standard:**

2. **For the information shown on the diagram on the right side of the typical application, where inadequate acceleration distance exists for the temporary entrance, the YIELD sign shall be replaced with STOP signs (one on each side of the approach).**

Guidance:

3. When used, the YIELD or STOP sign should be located so that ramp vehicular traffic has adequate sight distance of oncoming mainline vehicular traffic to select a reasonably safe gap in the mainline vehicular traffic flow. Also, a longer acceleration lane should be provided beyond the sign to reduce the gap size needed. If insufficient gaps are available, consideration should be given to closing the ramp.
4. Where STOP signs are used, a temporary stop line should be placed across the ramp at the desired stop location.
5. The mainline merging taper with the arrow panel at its starting point should be located sufficiently in advance so that the arrow panel is not confusing to drivers on the entrance ramp, and so that the mainline merging vehicular traffic from the lane closure has the opportunity to stabilize before encountering the vehicular traffic merging from the ramp.
6. If the ramp curves sharply to the right, warning signs with Advisory Speed Limits located in advance of the entrance terminal should be placed in pairs (one on each side of the ramp).

Option:

7. A Type B high-intensity warning flasher with a red lens may be placed above the STOP sign.
8. Where the acceleration distance is significantly reduced, a supplemental plaque may be placed below the YIELD AHEAD sign reading NO MERGE AREA.

Option:

The Department of Transportation's Standard Plan T10 may be used instead of this typical application.

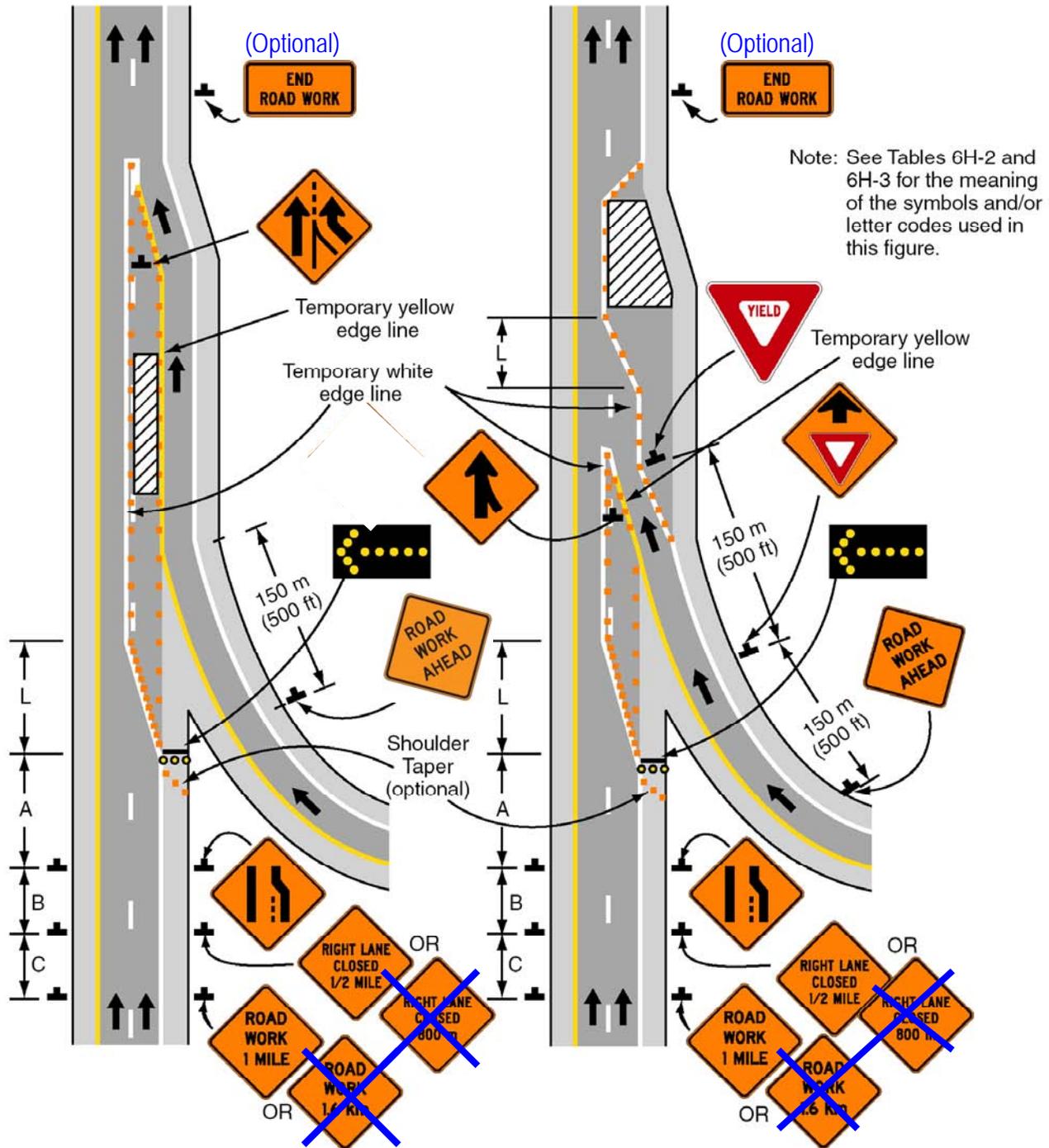
Support:

See Section 1A.11 for information regarding this publication.

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**Figure 6H-44. Work in Vicinity of Entrance Ramp (TA-44)**



**Typical Application 44**

## **Notes for Figure 6H-45—Typical Application 45**

### **Temporary Reversible Lane Using Movable Barriers**

**Support:**

1. This application addresses one of several uses for movable barriers in highway work zones. In this example, one side of a 6-lane divided highway is closed to perform the work operation, and vehicular traffic is carried in both directions on the remaining 3-lane roadway by means of a median crossover. To accommodate unbalanced peak-period vehicular traffic volumes, the direction of travel in the center lane is switched to the direction having the greater volume, with the transfer typically being made twice daily. Thus, there are four vehicular traffic phases described as follows:
  - a. Phase A—two travel lanes northbound and one lane southbound;
  - b. Transition A to B—one travel lane in each direction;
  - c. Phase B—one travel lane northbound and two lanes southbound; and
  - d. Transition B to A—one travel lane in each direction.

The typical application on the left illustrates the placement of devices during Phase A. The typical application on the right shows conditions during the transition (Transition A to B) from Phase A to Phase B.

**Guidance:**

2. For the reversible-lane situation depicted, the ends of the movable barrier should terminate in a protected area or a crash cushion should be provided. During Phase A, the transfer vehicle should be parked behind the end of the movable barrier. During Phase B, the transfer vehicle should be parked behind the end of the movable barrier.

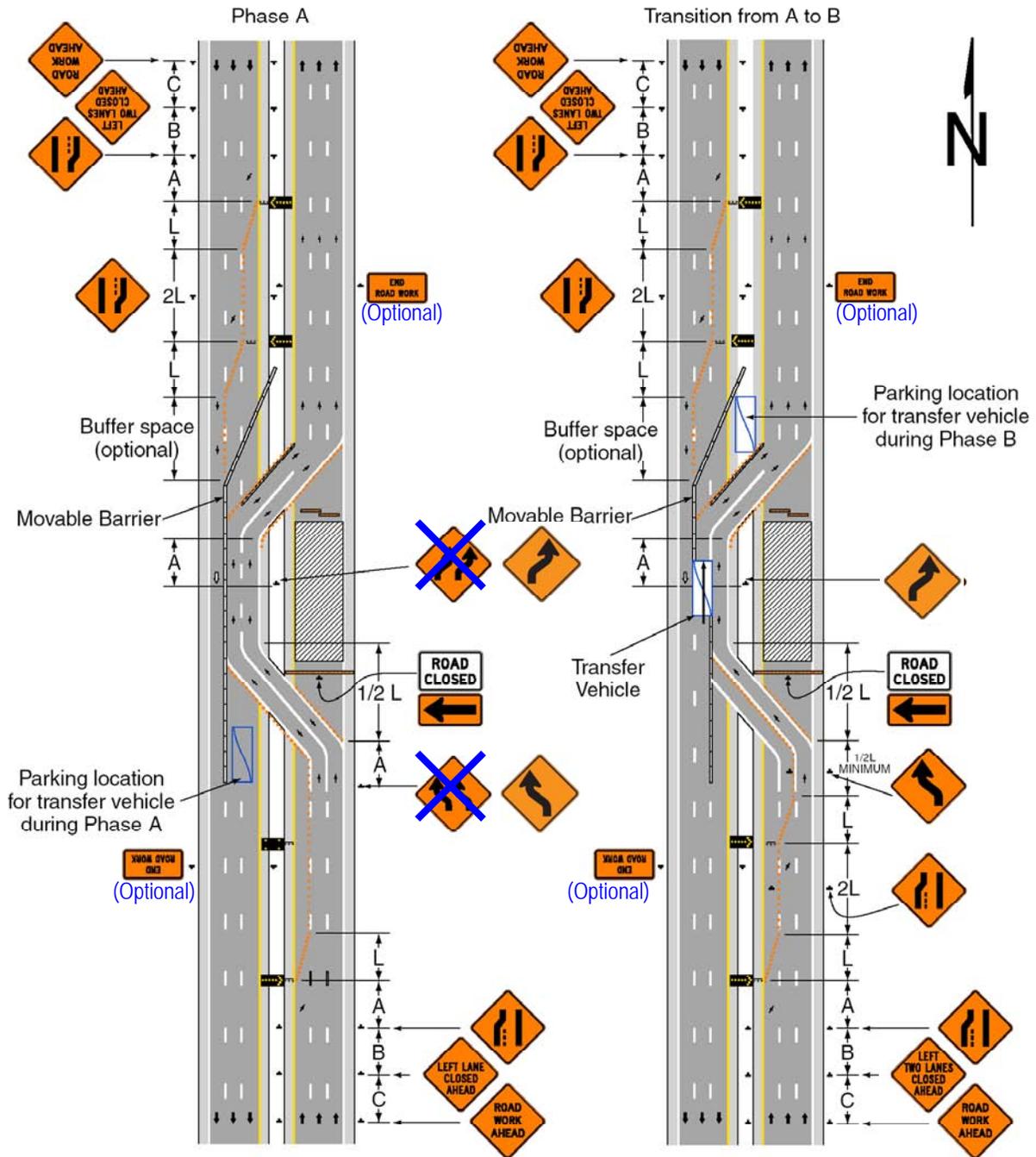
The transition shift from Phase A to B should be as follows:

- a. Change the signs in the northbound advance warning area and transition area from a LEFT LANE CLOSED AHEAD to a LEFT TWO LANES CLOSED AHEAD. Change the mode of the second northbound arrow panel from Caution to Right Arrow.
  - b. Place channelizing devices to close the northbound center lane.
  - c. Move the transfer vehicle from south to north to shift the movable barrier from the west side to the east side of the reversible lane.
  - d. Remove the channelizing devices closing the southbound center lane.
  - e. Change the signs in the southbound transition area and advance warning area from a LEFT TWO LANES CLOSED AHEAD to LEFT LANE CLOSED AHEAD. Change the mode of the second southbound arrow panel from Right Arrow to Caution.
3. Where the lane to be opened and closed is an exterior lane (adjacent to the edge of the traveled way or the work space), the lane closure should begin by closing the lane 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 transfer vehicle should travel against vehicular traffic. The merging taper should be removed in a method similar to a stationary lane closure.

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**Figure 6H-45. Movable Barriers (TA-45)**



**Typical Application 45**

Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure. Although leader lines point to signs on the right side of roadway, most signs should be installed on both sides of roadway.

## Notes for Figure 6H-46—Typical Application 46

### Work in Vicinity of Highway-Rail Grade Crossing

Guidance:

1. When highway-rail grade crossings exist either within or in the vicinity of roadway work activities, extra care should be taken to minimize the probability of conditions being created, either by lane restrictions, flagging or other operations, where vehicles might be stopped within the highway-rail grade crossing, considered as being 4.6 m (15 ft) on either side of the closest and farthest rail.

**Standard:**

- 2. If the queuing of vehicles across active rail tracks cannot be avoided, a uniformed law enforcement officer or flagger shall be provided at the highway-rail grade crossing to prevent vehicles from stopping within the highway-rail grade crossing (as described in Note 1), even if automatic warning devices are in place.**

Guidance:

3. Early coordination with the railroad company should occur before work starts.
4. In the example depicted, the buffer space of the activity area should be extended upstream of the highway-rail grade crossing (as shown) so that a queue created by the flagging operation will not extend across the highway-rail grade crossing.
5. The DO NOT STOP ON TRACKS sign should be used on all approaches to a highway-rail grade crossing within the limits of a TTC zone.

Option:

6. Flashing warning lights and/or flags may be used to call attention to the advance warning signs.
7. A BE PREPARED TO STOP sign may be added to the sign series.

Guidance:

8. When used, the BE PREPARED TO STOP sign should be located ~~before~~ **after** the Flagger symbol sign.

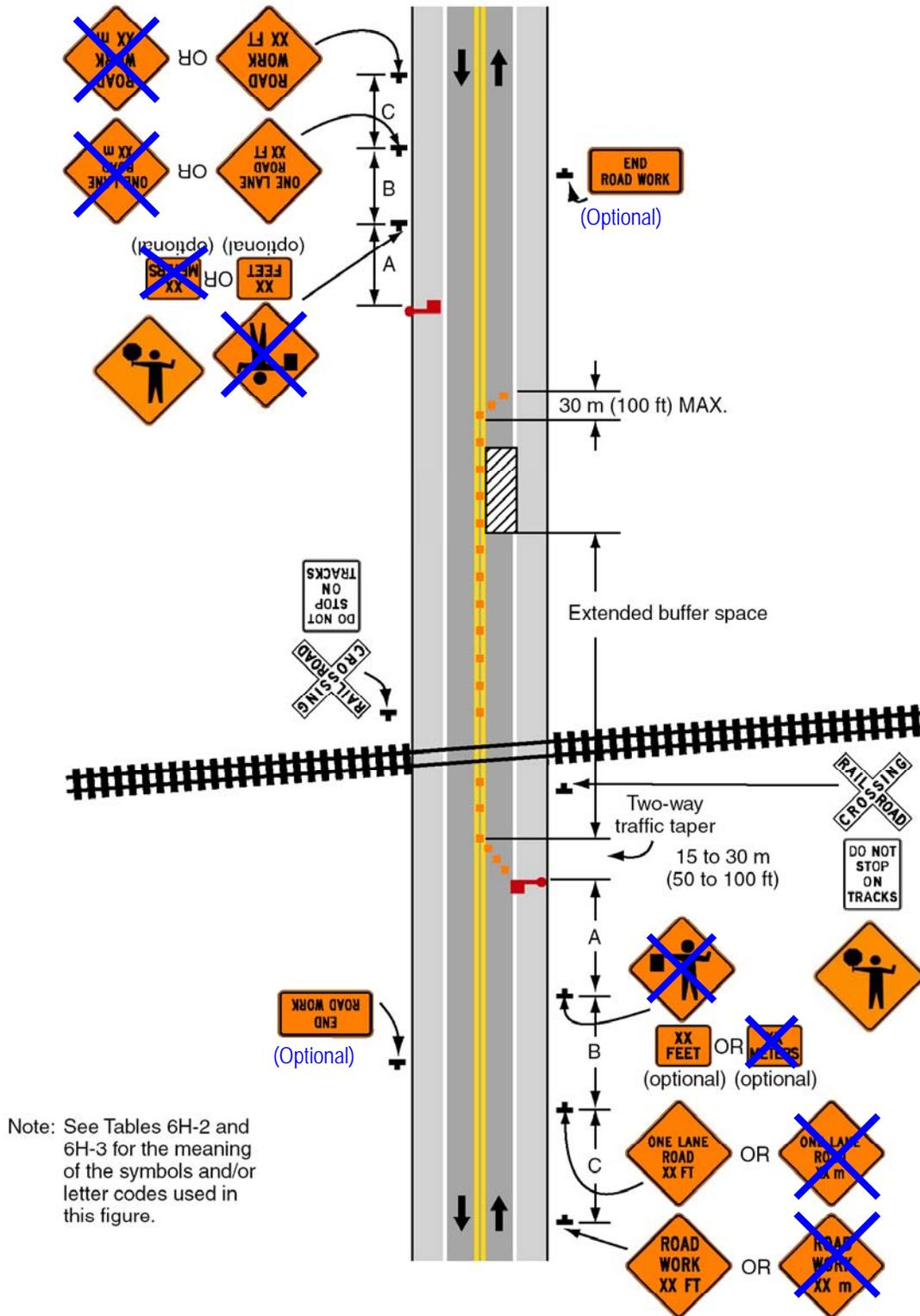
**Standard:**

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

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**Figure 6H-46. Work in Vicinity of Highway-Rail Grade-Crossing (TA-46)**



Note: See Tables 6H-2 and 6H-3 for the meaning of the symbols and/or letter codes used in this figure.

**Typical Application 46**

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## CHAPTER 6I. CONTROL OF TRAFFIC THROUGH TRAFFIC INCIDENT MANAGEMENT AREAS

### Section 6I.01 General

Support:

Whenever the acronym "TTC" is used in this Chapter, it refers to "temporary traffic control".

**Standard:**

**The needs and control of all road users (motorists, bicyclists, and pedestrians within the highway, including persons with disabilities in accordance with the Americans with Disabilities Act of 1990 (ADA), Title II, Paragraph 35.130) through a TTC zone shall be an essential part of highway construction, utility work, maintenance operations, and the management of traffic incidents.**

Support:

A traffic incident is an emergency road user occurrence, a natural disaster, or other unplanned event that affects or impedes the normal flow of traffic.

A traffic incident management area is an area of a highway where temporary traffic controls are imposed by authorized officials in response to a road user incident, natural disaster, hazardous material spill, or other unplanned incident. It is a type of TTC zone and extends from the first warning device (such as a sign, light, or cone) to the last TTC device or to a point where vehicles return to the original lane alignment and are clear of the incident.

Traffic incidents can be divided into three general classes of duration, each of which has unique traffic control characteristics and needs. These classes are:

- A. Major—expected duration of more than 2 hours;
- B. Intermediate—expected duration of 30 minutes to 2 hours; and
- C. Minor—expected duration under 30 minutes.

The primary functions of TTC at a traffic incident management area are to move road users reasonably safely and expeditiously past or around the traffic incident, to reduce the likelihood of secondary traffic crashes, and to preclude unnecessary use of the surrounding local road system. Examples include a stalled vehicle blocking a lane, a traffic crash blocking the traveled way, a hazardous material spill along a highway, and natural disasters such as floods and severe storm damage.

Guidance:

In order to reduce response time for traffic incidents, highway agencies, appropriate public safety agencies (law enforcement, fire and rescue, emergency communications, emergency medical, and other emergency management), and private sector responders (towing and recovery and hazardous materials contractors) should mutually plan for occurrences of traffic incidents along the major and heavily traveled highway and street system.

On-scene responders should be trained in safe practices for accomplishing their tasks in and near traffic. Responders should always be aware of their visibility to oncoming traffic and take measures to move the traffic incident as far off the traveled roadway as possible or to provide for appropriate warning.

Responders arriving at a traffic incident should, within 15 minutes of arrival on-scene, estimate the magnitude of the traffic incident, the expected time duration of the traffic incident, and the expected vehicle queue length, and then should set up the appropriate temporary traffic controls for these estimates.

Option:

Warning and guide signs used for TTC traffic incident management situations may have a black legend and border on a fluorescent pink background (see Figure 6I-1).

Support:

While some traffic incidents might be anticipated and planned for, emergencies and disasters might pose more severe and unpredictable problems. The ability to quickly install proper temporary traffic controls might greatly reduce the effects of an incident, such as secondary crashes or excessive traffic delays. An essential part of fire, rescue, spill clean-up, highway agency, and enforcement activities is the proper control of road users through the traffic incident management area in order to protect responders, victims, and other personnel at the site while providing reasonably safe traffic flow. These operations might need corroborating legislative authority for the implementation and enforcement of appropriate road user regulations, parking

controls, and speed zoning. It is desirable for these statutes to provide sufficient flexibility in the authority for, and implementation of, TTC to respond to the needs of changing conditions found in traffic incident management areas.

Option:

For traffic incidents, particularly those of an emergency nature, TTC devices on hand may be used for the initial response as long as they do not themselves create unnecessary additional hazards.

### **Section 6I.02 Major Traffic Incidents**

Support:

Major traffic incidents are typically traffic incidents involving hazardous materials, fatal traffic crashes involving numerous vehicles, and other natural or man-made disasters. These traffic incidents typically involve closing all or part of a roadway facility for a period exceeding 2 hours.

Guidance:

If the traffic incident is anticipated to last more than 24 hours, applicable procedures and devices set forth in other Chapters of Part 6 should be used.

Support:

A road closure can be caused by a traffic incident such as a road user crash that blocks the traveled way. Road users are usually diverted through lane shifts or detoured around the traffic incident and back to the original roadway. A combination of traffic engineering and enforcement preparations is needed to determine the detour route, and to install, maintain or operate, and then to remove the necessary traffic control devices when the detour is terminated. Large trucks are a significant concern in such a detour, especially when detouring them from a controlled-access roadway onto local or arterial streets.

During traffic incidents, large trucks might need to follow a route separate from that of automobiles because of bridge, weight, clearance, or geometric restrictions. Also, vehicles carrying hazardous material might need to follow a different route from other vehicles.

Some traffic incidents such as hazardous material spills might require closure of an entire highway. Through road users must have adequate guidance around the traffic incident. Maintaining good public relations is desirable. The cooperation of the news media in publicizing the existence of, and reasons for, traffic incident management areas and their TTC can be of great assistance in keeping road users and the general public well informed.

The establishment, maintenance, and prompt removal of lane diversions can be effectively managed by interagency planning that includes representatives of highway and public safety agencies.

Guidance:

All traffic control devices needed to set up the TTC at a traffic incident should be available so that they can be readily deployed for all major traffic incidents. The TTC should include the proper traffic diversions, tapered lane closures, and upstream warning devices to alert approaching traffic of the end of a queue.

Attention should be paid to the end of the traffic queue such that warning is given to road users approaching the end of the queue.

If manual traffic control is needed, it should be provided by qualified flaggers or uniformed law enforcement officers.

Option:

If flaggers are used to provide traffic control for an incident management situation, the flaggers may use appropriate traffic control devices that are readily available or that can be brought to the traffic incident scene on short notice.

Guidance:

When flares are used to initiate TTC at traffic incidents, more permanent traffic control devices should replace them as soon as practical. Both the flare and its supporting device should then be removed from the roadway.

On-scene responders should be trained in safe practices for accomplishing their tasks in and near traffic. Responders should always be aware of their visibility to oncoming traffic and take measures to move the traffic incident as far off the traveled roadway as possible or to provide for appropriate warning.

### **Section 6I.03 Intermediate Traffic Incidents**

#### **Support:**

Intermediate traffic incidents typically affect travel lanes for a time period of 30 minutes to 2 hours, and usually require traffic control on the scene to divert road users past the blockage. Full roadway closures might be needed for short periods during traffic incident clearance to allow traffic incident responders to accomplish their tasks.

The establishment, maintenance, and prompt removal of lane diversions can be effectively managed by interagency planning that includes representatives of highway and public safety agencies.

#### **Guidance:**

All traffic control devices needed to set up the TTC at a traffic incident should be available so that they can be readily deployed for intermediate traffic incidents. The TTC should include the proper traffic diversions, tapered lane closures, and upstream warning devices to alert approaching traffic of the end of a queue.

Attention should be paid to the end of the traffic queue such that warning is given to road users approaching the end of the queue.

If manual traffic control is needed, it should be provided by qualified flaggers or uniformed law enforcement officers.

#### **Option:**

If flaggers are used to provide traffic control for an incident management situation, the flaggers may use appropriate traffic control devices that are readily available or that can be brought to the traffic incident scene on short notice.

#### **Guidance:**

When flares are used to initiate TTC at traffic incidents, more permanent traffic devices should replace them as soon as practical. Both the flare and its supporting device should then be removed from the roadway.

On-scene responders should be trained in safe practices for accomplishing their tasks in and near traffic. Responders should always be aware of their visibility to oncoming traffic and take measures to move the traffic incident as far off the traveled roadway as possible or to provide for appropriate warning.

### **Section 6I.04 Minor Traffic Incidents**

#### **Support:**

Minor traffic incidents are typically disabled vehicles and minor crashes that result in lane closures of less than 30 minutes. On-scene responders are typically law enforcement and towing companies, and occasionally highway agency service patrol vehicles.

Diversion of traffic into other lanes is often not needed or is needed only briefly. It is not generally possible or practical to set up a lane closure with traffic control devices for a minor traffic incident. Traffic control is the responsibility of on-scene responders.

#### **Guidance:**

When a minor traffic incident blocks a travel lane, it should be removed from that lane to the shoulder as quickly as possible.

### **Section 6I.05 Use of Emergency-Vehicle Lighting**

#### **Support:**

The use of emergency-vehicle lighting (such as high-intensity rotating, flashing, oscillating, or strobe lights) is essential, especially in the initial stages of a traffic incident, for the safety of emergency responders and persons involved in the traffic incident, as well as road users approaching the traffic incident. Emergency-vehicle lighting, however, provides warning only and provides no effective traffic control. It is often confusing to road users, especially at night. Road users approaching the traffic incident from the opposite direction on a divided facility are often distracted by emergency-vehicle lighting and slow their vehicles to look at the traffic incident posing a hazard to themselves and others traveling in their direction.

The use of emergency-vehicle lighting can be reduced if good traffic control has been established at a traffic incident scene. This is especially true for major traffic incidents that might involve a number of emergency vehicles. If good traffic control is established through placement of advanced warning signs and

traffic control devices to divert or detour traffic, then public safety agencies can perform their tasks on scene with minimal emergency-vehicle lighting.

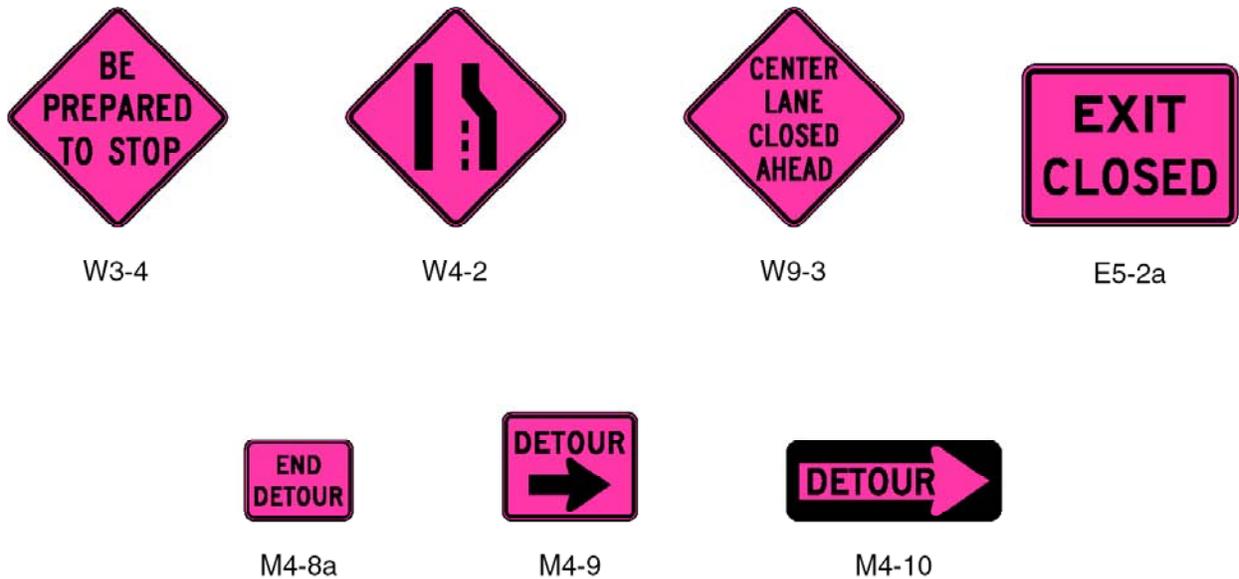
Guidance:

Public safety agencies should examine their policies on the use of emergency-vehicle lighting, especially after a traffic incident scene is secured, with the intent of reducing the use of this lighting as much as possible while not endangering those at the scene. Special consideration should be given to reducing or extinguishing forward facing emergency-vehicle lighting, especially on divided roadways, to reduce distractions to on-coming road users.

Vehicle headlights not needed for illumination, or to provide notice to other road users of the incident response vehicle being in an unexpected location, should be turned off at night.

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**Figure 6I-1. Examples of Traffic Incident Management Area Signs**



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# California

# Manual on Uniform

# Traffic Control Devices

for Streets and Highways  
(FHWA's MUTCD 2003 Edition,  
as amended for use in California)

## APPENDIX



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

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**APPENDIX**

**TABLE OF CONTENTS**

		<b><u>Page</u></b>
A1	Congressional Legislation	A1-1
A101(CA)	California Sign Chart (September 2006)	A101(CA)-1
A102(CA)	List of Acronyms & Abbreviations	A102(CA)-1
A103(CA)	List of Useful TCD Related Web Sites	A103(CA)-1

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## CONGRESSIONAL LEGISLATION

### **PUBLIC LAW 102-240-DEC. 18, 1991 (INTERMODAL SURFACE TRANSPORTATION EFFICIENCY ACT OF 1991)**

**Section 1077. REVISION OF MANUAL** — Not later than 90 days after the date of the enactment of this Act, the Secretary shall revise the Manual of Uniform Traffic Control Devices and such other regulations and agreements of the Federal Highway Administration as may be necessary to authorize States and local governments, at their discretion, to install stop or yield signs at any rail-highway grade crossing without automatic traffic control devices with 2 or more trains operating across the rail-highway grade crossing per day.

### **PUBLIC LAW 102-388-OCT. 6, 1992 (DEPARTMENT OF TRANSPORTATION AND RELATED AGENCIES APPROPRIATIONS ACT, 1993)**

**Section 406** — The Secretary of Transportation shall revise the Manual of Uniform Traffic Control Devices to include —

- (a) a standard for a minimum level of retroreflectivity that must be maintained for pavement markings and signs, which shall apply to all roads open to public travel; and
- (b) a standard to define the roads that must have a centerline or edge lines or both, provided that in setting such standard the Secretary shall consider the functional classification of roads, traffic volumes, and the number and width of lanes.

### **PUBLIC LAW 104-59-NOV. 28, 1995 (NATIONAL HIGHWAY SYSTEM DESIGNATION ACT OF 1995)**

**Section 205. RELIEF FROM MANDATES** —

(c) METRIC REQUIREMENTS —

(1) PLACEMENT AND MODIFICATION OF SIGNS — The Secretary shall not require the States to expend any Federal or State funds to construct, erect, or otherwise place or to modify any sign relating to a speed limit, distance, or other measurement on a highway for the purpose of having such sign establish such speed limit, distance, or other measurement using the metric system.

(2) OTHER ACTIONS — Before September 30, 2000, the Secretary shall not require that any State use or plan to use the metric system with respect to designing or advertising, or preparing plans, specifications, estimates, or other documents, for a Federal-aid highway project eligible for assistance under title 23, United States Code.

(3) DEFINITIONS — In this subsection, the following definitions apply:

(A) HIGHWAY — The term 'highway' has the meaning such term has under section 101 of title 23, United State Code.

(B) METRIC SYSTEM — the term 'metric system' has the meaning the term 'metric system of measurement' has under section 4 of the Metric Conversion Act of 1975 (15 U.S.C. 205c).

**Section 306. MOTORIST CALL BOXES** — Section 111 of title 23, United States Code, is amended by adding at the end the following:

(c) MOTORIST CALL BOXES—

(1) IN GENERAL— Notwithstanding subsection (a), a State may permit the placement of motorist call boxes on rights-of-way of the National Highway System. Such motorist call boxes may include the identification and sponsorship logos of such call boxes.

(2) SPONSORSHIP LOGOS—

(A) APPROVAL BY STATE AND LOCAL AGENCIES—All call box installations displaying sponsorship logos under this subsection shall be approved by the highway agencies having jurisdiction of the highway on which they are located.

(B) **SIZE ON BOX**—A sponsorship logo may be placed on the call box in a dimension not to exceed the size of the call box or a total dimension in excess of 12 inches by 18 inches.

(C) **SIZE ON IDENTIFICATION SIGN**—Sponsorship logos in a dimension not to exceed 12 inches by 30 inches may be displayed on a call box identification sign affixed to the call box post.

(D) **SPACING OF SIGNS**—Sponsorship logos affixed to an identification sign on a call box post may be located on the rights-of-way at intervals not more frequently than 1 per every 5 miles.

(E) **DISTRIBUTION THROUGHOUT STATE**—Within a State, at least 20 percent of the call boxes displaying sponsorship logos shall be located on highways outside of urbanized areas with a population greater than 50,000.

(3) **NONSAFETY HAZARDS**—The call boxes and their location, posts, foundations, and mountings shall be consistent with requirements of the Manual on Uniform Traffic Control Devices or any requirements deemed necessary by the Secretary to assure that the call boxes shall not be a safety hazard to motorists.

**Section 353(a) SIGNS** — Traffic control signs referred to in the experimental project conducted in the State of Oregon in December 1991 shall be deemed to comply with the requirements of Section 2B-4 of the Manual on Uniform Traffic Control Devices of the Department of Transportation.

**Section 353(b) STRIPES** — Notwithstanding any other provision of law, a red, white, and blue center line in the Main Street of Bristol, Rhode Island, shall be deemed to comply with the requirements of Section 3B-1 of the Manual on Uniform Traffic Control Devices of the Department of Transportation.

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## APPENDIX A101(CA). CALIFORNIA SIGN CHART (September 2006)

### Support:

The most commonly used signs in California are shown in the California Sign Chart (September 2006). This chart is not meant to be used as a comprehensive sign chart but is provided on the following pages for ease of use and as a handy reference. It consists of the following sheets:

- Regulatory Signs (Sheets 1 through 3 of 10).
  - Warning Signs (Sheets 4 and 5 of 10).
  - Guide Signs (Sheets 6 through 8 of 10).
  - Temporary Traffic Control Signs (Sheets 9 and 10 of 10).
- 

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# California Sign Chart

California Department of Transportation  
Signs and Work Zones Branch  
September 2006



## Sheet 1 of 10 - Federal Regulatory Signs

This chart contains commonly used signs in California, and is not meant to be used as a comprehensive sign chart.

California codes are designated by (CA). Otherwise Federal codes are shown. For a complete directory of signs, visit [www.dot.ca.gov/hq/traffops/signtech/signdel/index.htm](http://www.dot.ca.gov/hq/traffops/signtech/signdel/index.htm).



R1-1



R1-2



R1-2a



R1-4



R1-5a



R2-1



R3-1



R3-2



R3-3



R3-4



R3-5



R3-5a



R3-6



R3-7



R3-8



R3-8a



R3-8b



R3-9a



R3-18



R4-1



R4-3



R4-5



R4-6



R4-7



R4-7a



R4-7b



R4-8



R4-10



R5-1



R5-1a



R5-2



R5-6



R5-10a



R6-1



R6-2



R6-3



R6-3a



R7-6



R7-7



R7-8b



R7-9



R7-107



R7-201a



R7-202



R8-3a



R8-3c



R8-3d



R8-4



R8-8



R9-2



R9-3



R9-3a



R9-3b



R10-3



R10-4



R10-4b



R10-6



R10-7



R10-11



R10-12



R10-15



R11-2



R12-1



R12-5



R14-1



R15-1



R15-2



S4-2



S5-2

# California Sign Chart

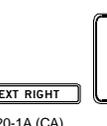
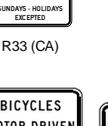
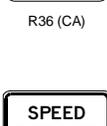
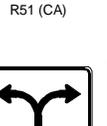
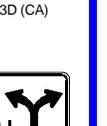
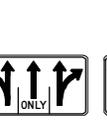
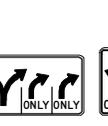
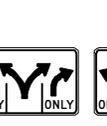
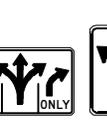
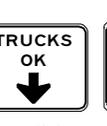
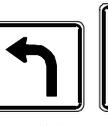
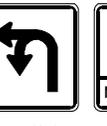
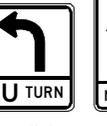
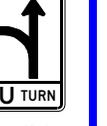
California Department of Transportation  
Signs and Work Zones Branch  
September 2006



## Sheet 2 of 10 - California Regulatory Signs

This chart contains commonly used signs in California, and is not meant to be used as a comprehensive sign chart.

California codes are designated by (CA). Otherwise Federal codes are shown. For a complete directory of signs, visit [www.dot.ca.gov/hq/traffops/signtech/signdel/index.htm](http://www.dot.ca.gov/hq/traffops/signtech/signdel/index.htm).

 R2-4 (CA)	 R3 (CA)	 R6-3 (CA)	 R6-3A (CA)	 R6-4 (CA)	 R6-4A (CA)	 R13A (CA)	 R13B (CA)	 R18A (CA)	 R18A (CA)
 R18B (CA)	 R20A (CA)	 R20D-1 (CA)	 R20D-2 (CA)	 R20D-3 (CA)	 R20D-4 (CA)	 R20H (CA)	 R20-1 (CA)	 R20-1A (CA)	 R21 (CA)
 R23 (CA)	 R24 (CA)	 R25 (CA)	 R26 (CA)	 R26A (CA)	 R26A(S) (CA)	 R26B (CA)	 R26C (CA)	 R26F (CA)	 R26J (CA)
 R26(S) (CA)	 R27 (CA)	 R27A (CA)	 R28 (CA)	 R28A (CA)	 R28A(S) (CA)	 R28B (CA)	 R28(S) (CA)	 R29 (CA)	 R30 (CA)
 R30A (CA)	 R31 (CA)	 R31(S) (CA)	 R32 (CA)	 R32A (CA)	 R32B (CA)	 R33 (CA)	 R33A (CA)	 R33B (CA)	 R33C (CA)
 R36 (CA)	 R37 (CA)	 R38 (CA)	 R38(S) (CA)	 R40 (CA)	 R44A (CA)	 R44B (CA)	 R44C (CA)	 R47 (CA)	 R47A (CA)
 R48 (CA)	 R48-1 (CA)	 R48-2 (CA)	 R50 (CA)	 R51 (CA)	 R52 (CA)	 R52A (CA)	 R53A (CA)	 R53B (CA)	 R53D (CA)
 R53E (CA)	 R55 (CA)	 R57 (CA)	 R58 (CA)	 R60B (CA)	 R61-1 (CA)	 R61-3 (CA)	 R61-5 (CA)	 R61-7 (CA)	 R61-9 (CA)
 R61-11 (CA)	 R61-13 (CA)	 R61-15 (CA)	 R61-17 (CA)	 R61-19 (CA)	 R61-22 (CA)	 R61-24 (CA)	 R61-26 (CA)	 R61-28 (CA)	 R61-30 (CA)
 R61-32 (CA)	 R61-34 (CA)	 R61-36 (CA)	 R62C (CA)	 R62E (CA)	 R70 (CA)	 R73-1 (CA)	 R73-2 (CA)	 R73-3 (CA)	 R73-4 (CA)

# California Sign Chart

California Department of Transportation  
Signs and Work Zones Branch  
September 2006



## Sheet 3 of 10 - California Regulatory Signs (Continued)

This chart contains commonly used signs in California, and is not meant to be used as a comprehensive sign chart.

California codes are designated by (CA). Otherwise Federal codes are shown. For a complete directory of signs, visit [www.dot.ca.gov/hq/traffops/signtech/signdel/index.htm](http://www.dot.ca.gov/hq/traffops/signtech/signdel/index.htm).

R73-5 (CA)	R73-6 (CA)	R73-8 (CA)	R73-9 (CA)	R74 (CA)	R75 (CA)	R76 (CA)	R76-1 (CA)	R77 (CA)	R78 (CA)	
R79 (CA)	R80-1 (CA)	R81 (CA)	R81A (CA)	R81B (CA)	R82A (CA)	R82B (CA)	R82-1 (CA)	R84-1 (CA)	R84-2 (CA)	
R86 (CA)	R86-2 (CA)	R86-3 (CA)	R87-1 (CA)	R87-2 (CA)	R88 (CA)	R89-1 (CA)	R89-2 (CA)	R89-3 (CA)	R90-1 (CA)	R91 (CA)
R91-1 (CA)	R91-2 (CA)	R91-3 (CA)	R91B (CA)	R92 (CA)	R93A (CA)	R93-2 (CA)	R94 (CA)	R99 (CA)	R100A (CA)	
R100B (CA)	R101 (CA)	R102 (CA)	R102A (CA)	R103 (CA)	R103A (CA)	R104 (CA)	R104A (CA)	R105 (CA)	R105A (CA)	
S3-1 (CA)	S8 (CA)	S20 (CA)	S21 (CA)	S22 (CA)	S23 (CA)	S24 (CA)	S30-1 (CA)	S30-2 (CA)	S30-3 (CA)	
S30-4 (CA)	S30-5 (CA)	S33 (CA)	S34 (CA)	SR2 (CA)	SR5-1 (CA)	SR6-1 (CA)	SR7-1 (CA)	SR8-1 (CA)	SR9-1 (CA)	SR10-1 (CA)
SR11-1 (CA)	SR12-1 (CA)	SR13-1 (CA)	SR15 (CA)	SR15A (CA)	SR17 (CA)	SR18 (CA)	SR19-1 (CA)	SR20-1 (CA)	SR22-1 (CA)	
SR23-1 (CA)	SR27-1	SR39A (CA)	SR39A(U) (CA)	SR40 (CA)	SR41 (CA)	SR42 (CA)	SR43 (CA)	SR44 (CA)	SR46 (CA)	
SR47 (CA)	SR50-1 (CA)	SR50-2 (CA)	SR53 (CA)	SR54 (CA)	SR55 (CA)	SR56 (CA)	SR57 (CA)	SR58 (CA)	SR59 (CA)	

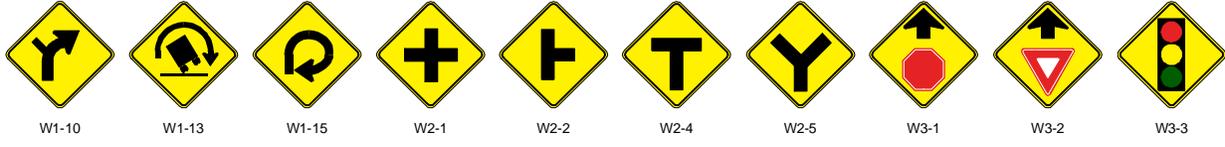
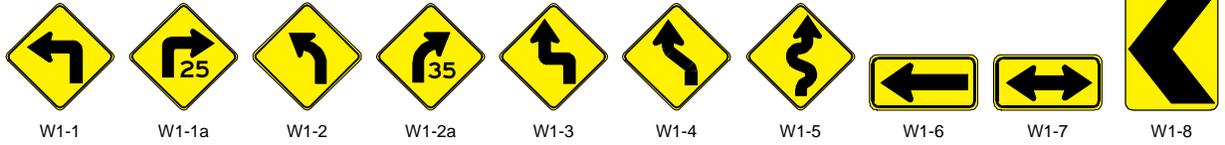
# California Sign Chart

## Sheet 4 of 10 - Federal Warning Signs

This chart contains commonly used signs in California, and is not meant to be used as a comprehensive sign chart.

California codes are designated by (CA). Otherwise Federal codes are shown. For a complete directory of signs, visit [www.dot.ca.gov/hq/traffops/signtech/signdel/index.htm](http://www.dot.ca.gov/hq/traffops/signtech/signdel/index.htm).

California Department of Transportation  
Signs and Work Zones Branch  
September 2006



# California Sign Chart

## Sheet 5 of 10 - California Warning Signs

This chart contains commonly used signs in California, and is not meant to be used as a comprehensive sign chart.

California codes are designated by (CA). Otherwise Federal codes are shown. For a complete directory of signs, visit [www.dot.ca.gov/hq/traffops/signtech/signdel/index.htm](http://www.dot.ca.gov/hq/traffops/signtech/signdel/index.htm).

California Department of Transportation  
Signs and Work Zones Branch  
September 2006



W4-1 (CA)



W4-10 (CA)



W4-14 (CA)



W4-18 (CA)



W4-22 (CA)



W11-1 (CA)



W20 (CA)



W20A (CA)



W30B (CA)



W30C (CA)



W31 (CA)



W31A (CA)



W34A (CA)



W34C (CA)



W38 (CA)



W43 (CA)



W44A (CA)



W46A (CA)



W48 (CA)



W49 (CA)



W50 (CA)



W50-1 (CA)



W51 (CA)



W55 (CA)



W55B (CA)



W59-1 (CA)



W61A (CA)



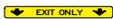
W61B (CA)



W61C (CA)



W61D (CA)



W61E (CA)



W61F (CA)



W61G (CA)



W61H (CA)



W66B (CA)



W69 (CA)



W70 (CA)



W72B (CA)



W73 (CA)



W73A (CA)



W74-1 (CA)



W75-1 (CA)



W82 (CA)



W82-1 (CA)



W83 (CA)



SW4-1 (CA)



SW17-1 (CA)



SW22-1 (CA)



SW22-1A (CA)



SW26 (CA)



SW28 (CA)



SW32 (CA)



SW35 (CA)



SW36 (CA)



SW37 (CA)



SW38 (CA)



SW41 (CA)



SW44 (CA)



SW45 (CA)



SW46 (CA)



SW47 (CA)



SW48 (CA)



SW48-1 (CA)



SW49 (CA)



SW50 (CA)



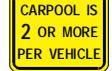
SW52 (CA)



SW54 (CA)



SW54-1 (CA)



SW54A (CA)



SW54B (CA)



SW54C (CA)



SW58 (CA)



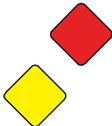
SW59 (CA)



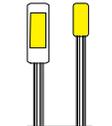
Type R (CA)



Type P (CA)



Type N (CA)



Type L (CA)



Type K (CA)



Type Q (CA)

# California Sign Chart

## Sheet 6 of 10 - Federal Guide Signs

This chart contains commonly used signs in California, and is not meant to be used as a comprehensive sign chart.

California codes are designated by (CA). Otherwise Federal codes are shown. For a complete directory of signs, visit [www.dot.ca.gov/hq/traffops/signtech/signdel/index.htm](http://www.dot.ca.gov/hq/traffops/signtech/signdel/index.htm).

California Department of Transportation  
Signs and Work Zones Branch  
September 2006



 D3-1	 D3-2	 D4-1	 D4-2	 D5-1	 D5-2	 D7-1	 D8-1	 D9-1	 D9-2
 D9-3a	 D9-6	 D9-7	 D9-8	 D9-9	 D9-11	 D9-11a	 D9-11b	 D9-13	 D9-17
 D11-1	 D12-1	 E9	 I-3	 I-5	 I-7	 I-12	 M1-1 Shield	 M1-6	 M1-7
 M2-1	 M3-3	 M3-4	 M4-3	 M4-5	 M4-7	 M4-11	 M5-2	 M6-2	 M6-4
 M3-1	 M3-2	 M4-1	 M4-4	 M4-6	 M4-12	 M5-1	 M6-1	 M6-3	 M6-6

Note: These Federal M series signs may be used as white on green, white on blue, or black on white as appropriate.

 RL-100	 RM-010	 RM-120	 RS-040	 RS-070	 RW-080	 RW-130	 Diagrammatic Sign
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# California Sign Chart

## Sheet 7 of 10 - California Guide Signs

This chart contains commonly used signs in California, and is not meant to be used as a comprehensive sign chart.

California codes are designated by (CA). Otherwise Federal codes are shown. For a complete directory of signs, visit [www.dot.ca.gov/hq/traffops/signtech/signdel/index.htm](http://www.dot.ca.gov/hq/traffops/signtech/signdel/index.htm).

California Department of Transportation  
Signs and Work Zones Branch  
September 2006



G1-1 (CA)	G1-4 (CA)	G1-7 (CA)	G1-10 (CA)	G1-13 (CA)	G1-16 (CA)	G1-19 (CA)	G5 (CA)	G8-1 (CA)	G8-4 (CA)
G8-7 (CA)	G8-10 (CA)	G8-13 (CA)	G8-16 (CA)	G8-19 (CA)	G8-22 (CA)	G9-2 (CA)	G9-5 (CA)	G10 (CA)	G10B (CA)
G11-1 (CA)	G11-4.1 (CA)	G11-6 (CA)	G11-7 (CA)	G11-8 (CA)	G13-1 (CA)	G13-2 (CA)	G14 (CA)	G15 (CA)	G16 (CA)
G11-2 (CA)	G11-4A (CA)							G17 (CA)	
G20-1 (CA)	G20-3 (CA)	G20-5 (CA)	G20-7 (CA)	G20-9 (CA)	G21-1 (CA)	G21-3 (CA)	G22 (CA)	G23-1 (CA)	G23-2 (CA)
G23-3 (CA)	G23-4 (CA)	G23-5 (CA)	G23-6 (CA)	G24-1 (CA)	G24-3 (CA)	G24-4 (CA)	G24-5 (CA)	G24-6 (CA)	
G26-1 (CA) Shield	G26-2 (CA) Marker	G27-1 (CA) Shield	G27-2 (CA) Marker	G28-1 (CA) Shield	G28-2 (CA) Marker	G30 (CA)	G30A (CA)	G30B (CA)	G33-1 (CA)
G58 (CA)	G66-11 (CA)	G66-12A (CA)	G66-21 (CA)	G66-21A (CA)	G66-22A (CA)	G66-22B (CA)	G66-55 (CA)	G66-56 (CA)	G66-56A (CA)
G66-57 (CA)	G66-58 (CA)	G66-59 (CA)	G66-60 (CA)	G66-61 (CA)	G66-62 (CA)	G68 (CA)	G69 (CA)	G70-2 (CA)	G70-3 (CA)
G70-5 (CA)	G72 (CA)	G77-1 (CA)	G77-4 (CA)	G77-7 (CA)	G78-1 (CA)	G78-4 (CA)	G79A (CA)	G81-21 (CA)	G81-52 (CA)
G81-61 (CA)	G81-62 (CA)	G81-63 (CA)	G81-64A (CA)	G81-65 (CA)	G82 (CA)	G83-1 (CA)	G83-2 (CA)	G83-3 (CA)	G83-4 (CA)
								G83-5 (CA)	

# California Sign Chart

## Sheet 8 of 10 - California Guide Signs (Continued)

This chart contains commonly used signs in California, and is not meant to be used as a comprehensive sign chart.

California codes are designated by (CA). Otherwise Federal codes are shown. For a complete directory of signs, visit [www.dot.ca.gov/hq/traffops/signtech/signdel/index.htm](http://www.dot.ca.gov/hq/traffops/signtech/signdel/index.htm).

California Department of Transportation  
Signs and Work Zones Branch  
September 2006



 G84-1 (CA)	 G84-2 (CA)	 G84-3 (CA)	 G85-1 (CA) Main St	 G85-3 (CA)	 G85-4 (CA)	 G85-5 (CA) Oakland Rd East	 G85-7 (CA)	 G85-8 (CA)	 G85-9 (CA)
 G85-10 (CA)	 G85-11 (CA)	 G86-1 (CA)	 G86-3 (CA)	 G86-5 (CA)	 G86-7 (CA)	 G86-8 (CA)	 G86-9 (CA)	 G86-10 (CA)	 G86-11 (CA)
 G86-12 (CA)	 G86-13 (CA)	 G87 (CA)	 G92 (CA)	 G92-1 (CA)	 G93C (CA)	 G94-1 (CA)	 G95A (CA)	 G95B (CA)	 G95D (CA)
 G95E (CA)	 G95F (CA)	 G95G (CA)	 G96 (CA)	 G96A (CA)	 G200-80 (CA)	 G200-81 (CA)	 G200-81A (CA)	 G200-82 (CA)	 G200-82A (CA)
 SG2 (CA)	 SG2A (CA)	 SG8 (CA)	 SG19 (CA)	 SG20 (CA)	 SG25 (CA)	 SG25A (CA)	 SG26 (CA)	 SG28 (CA)	 SG30 (CA)
 SG31 (CA)	 SG32 (CA)	 SG33 (CA)	 SG35 (CA)	 SG38 (CA)	 SG41 (CA)	 SG42-1 (CA)	 SG42-2 (CA)	 SG42-3 (CA)	 SG42-4 (CA)
 SG42-5 (CA)	 SG42-6 (CA)	 SG42-7 (CA)	 SG42-8 (CA)	 SG42-9 (CA)	 SG42-10 (CA)	 SG42-11 (CA)	 SG42-12 (CA)	 SG44-1 (CA)	 SG44-2 (CA)
 SG47A (CA)	 SG47B (CA)	 SG47C (CA)	 SG47D (CA)	 SG49A (CA)	 S1-1 (CA)	 S2 (CA)	 S9 (CA)	 S10 (CA)	 S12 (CA)
 S16-8 (CA)	 S17 (CA)	 S18 (CA)	 S19 (CA)	 S25 (CA)	 S26 (CA)	 S27 (CA)	 S28 (CA)	 S29 (CA)	 S29-1 (CA)
 S29-2 (CA)	 S32 (CA)	 S32A (CA)	 S31-1 (CA)	 S32-1 (CA)	 S32-2 (CA)	 S32-3 (CA)	 S32-4 (CA)	 S32-5 (CA)	 S33-2 (CA)
 S32 (CA)	 S32A (CA)	 S32-1 (CA)	 S32-2 (CA)	 S32-3 (CA)	 S32-4 (CA)	 S32-5 (CA)	 S34 (CA)	 S35 (CA)	 S35-2 (CA)
 S32 (CA)	 S32A (CA)	 S32-1 (CA)	 S32-2 (CA)	 S32-3 (CA)	 S32-4 (CA)	 S32-5 (CA)	 S34 (CA)	 S35 (CA)	 S35-3 (CA)

# California Sign Chart

California Department of Transportation  
Signs and Work Zones Branch  
September 2006



## Sheet 9 of 10 - Federal Temporary Traffic Control Signs

This chart contains commonly used signs in California, and is not meant to be used as a comprehensive sign chart.

California codes are designated by (CA). Otherwise Federal codes are shown. For a complete directory of signs, visit [www.dot.ca.gov/hq/traffops/signtech/signdel/index.htm](http://www.dot.ca.gov/hq/traffops/signtech/signdel/index.htm).

									
E5-2	E5-2a	G20-1	G20-2	G20-4	M4-8	M4-8a	M4-9a	M4-10	R3-1
									
R4-1	R9-11a	R11-2	R11-2	R11-3a	R11-4	W1-4	W1-6	W1-8	W3-3
									
W3-4	W3-5	W3-5a	W4-1	W4-2	W8-6	W8-7	W8-9	W9-3	W8-12
									
W12-1	W12-2	W14-3	W16-2	W20-1	W20-2	W20-3	W20-3	W20-4	W20-5
									
W20-5a	W21-1	W21-1a	W21-2	W21-3	W21-5	W21-5b	W21-6	W21-7	W22-1
									
W22-2	W22-3	W23-1	Paddle	Paddle					

# California Sign Chart

California Department of Transportation  
Signs and Work Zones Branch  
September 2006



## Sheet 10 of 10 - California Temporary Traffic Control Signs

This chart contains commonly used signs in California, and is not meant to be used as a comprehensive sign chart.

California codes are designated by (CA). Otherwise Federal codes are shown. For a complete directory of signs, visit [www.dot.ca.gov/hq/traffops/signtech/signdel/index.htm](http://www.dot.ca.gov/hq/traffops/signtech/signdel/index.htm).



C9A (CA)



C12 (CA)



Front  
C17 (CA)



Back  
C17 (CA)



C20 (CA)



C23B (CA)



C24 (CA)



C27 (CA)



C29 (CA)



C30 (CA)



C30A (CA)



C31A (CA)



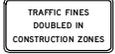
C37 (CA)



C37 (CA)



C38 (CA)



C40 (CA)



C40A (CA)



SC3 (CA)



SC5 (CA)



SC6-3 (CA)



SC6-4 (CA)



SC7 (CA)



SC8 (CA)



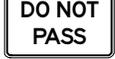
SC9 (CA)



SC10 (CA)



SC11 (CA)



SC13 (CA)



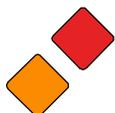
SC15 (CA)



Type R (CA)



Type P (CA)



Type N (CA)



Type II Barricade



Cone, Tubular Marker, Channelizer



Plastic Drum

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**APPENDIX A102(CA). LIST OF ACRONYMS & ABBREVIATIONS**

Support:

The following list of acronyms are related to traffic control devices and provided for ease of use and as a handy reference:

<u>A</u>	
@	At
AADT	Average Annual Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
ADT	Average Daily Traffic
AHS	Automated Highway System
Alt	Alternate
AM	Time from midnight to noon
AMBER	Use of CMS signs for child abduction alert messages
AMIS	Automated Management Information System
ANSI	American National Standards Institute
Approx	Approximate
APWA	American Public Works Association
ASCE	American Society of Civil Engineers
ASTM	American Society for Testing and Materials
ATIS	Advanced Traveler Information Systems
ATMS	Advanced Traffic Management System
ATSSA	American Traffic Safety Services Association
AVCS	Automated Vehicle Control System
Ave or AVE	Avenue
Avg	Average
<u>B</u>	
BART	Bay Area Rapid Transit
Bldg	Building
Bldv or BLVD	Boulevard
Br or BR	Bridge
BT&H	Business, Transportation & Housing Agency
<u>C</u>	
CA	California
CAC	California Administrative Code
Cal/OSHA	California Occupational Safety and Health Administration
CA MUTCD	California Manual on Uniform Traffic Control Devices for Streets and Highways
Caltrans	California Department of Transportation
CBD	Central Business District
CCMP	County Congestion Management Plan
CCO	Contract Change Order
CCR	California Code of Regulations
CDC	California Department of Conservation
CDF	California Department of Forestry
CDFG	California Department of Fish and Game

CEAC	County Engineers Association of California
CELSOC	Consulting Engineering and Land Surveyors of California
CFR	Code of Federal Regulations
CHIN	California Highway Information Network
CHP	California Highway Patrol
cm	Centimeter
CMA	Congestion Management Agency
CMP	Congestion Management Program
CMS	Changeable Message Sign or Congestion Management System
Co or CO	County
COB	Close of Business
COZEEP	Construction Zone Enhanced Enforcement Program
CPC	California Penal Code
CPH	California Permit Handbook
CPM	Critical Path Method
CPUC	California Public Utilities Commission
Cr or CR	Creek
CRHR	California Register of Historical Resources
CT	Caltrans or California Department of Transportation
CTA	California Trucking Association
CTC	California Transportation Commission
CTCDC	California Traffic Control Devices Committee
CTP	California Transportation Plan
CURE	Clean-up Roadside Environment
CVC	California Vehicle Code
<u>D</u>	
Deg	Degree
Del	Delineator
Det	Detour or Detail
DHV	Design Hourly Volume
DI	Delay Index, Drop Inlet or Drainage Inlet
Dia	Diameter
DIB	Design Information Bulletin
Dist	Distance or District
DMV	Department of Motor Vehicles
DOT	Department of Transportation
Dr or DR	Drive
DTO	Division of Traffic Operations
Dwy or DWY	Driveway
DYS	Double Yellow Stripe
<u>E</u>	
e.g.	"For Example"
E	East
EB	Eastbound, Environmental Branch or End of Bridge
Elev	Elevation
ENGR	Engineer or Engineering
EP	Edge of Pavement or Environmental Planning
ES	Edge of Shoulder or End Section

ESA	Environmentally Sensitive Area or Endangered Species Act
ESAL	Equivalent Single-Axle Loads
ETW	Edge of Traveled Way
Exp or EXP	Expressway
<u><b>E</b></u>	
F&E System	Freeway and Expressway System
FAI	Federal-aid Interstate
FAP	Federal-aid Primary
FCC	Federal Communication Commission
FEBT	Facing Eastbound Traffic
FHWA	Federal Highway Administration
Fig	Figure
FNBT	Facing Northbound Traffic
FR	Federal Register
Fr Rd	Frontage Road
FS	Far Side
FSBT	Facing Southbound Traffic
FSP	Freeway Service Patrol
Ft or FT	Foot or Feet
FWBT	Facing Westbound Traffic
Fwy or FWY	Freeway
<u><b>G</b></u>	
g	Acceleration due to gravity
GPS	Global Positioning System
GR	Guard Railing
<u><b>H</b></u>	
H	Height
HAR	Highway Advisory Radio
HAZMAT	Hazardous Material
HCM	Highway Capacity Manual
HDM	Highway Design Manual
HOT	High Occupancy Toll
HOV	High-Occupancy Vehicle
HOVL	High-Occupancy Vehicle Lane
HM	Hazardous Material
HQ	Caltrans Headquarters
Hr or HR	Hour
HW	Hazardous Waste
Hwy or HWY	Highway
<u><b>I</b></u>	
i.e.	"In Other Words"
IGR	Intergovernmental Review
ILEV	Inherently Low Emission Vehicle
in	Inch
Inj or INJ	Injury
IRLs	In-Roadway Lights
IRWLs	In-Roadway Warning Lights

ISO	International Standards Organization
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991 (Federal)
ITE	Institute of Transportation Engineers
ITS	Intelligent Transportation Systems or Institute of Transportation Studies
ITTE	Institute of Transportation & Traffic Engineering
IVHS	Intelligent Vehicle Highway System
<u>K</u>	
km	Kilometer
KP	Kilometer Post
<u>L</u>	
L	Length
Lat	Latitude
lb or LB	Pound
LED	Light Emitting Diode
LF	Linear Foot
Ln or LN	Lane
Loc or LOC	Location
LOS	Level of service (Traffic Congestion Measure)
LPA	Local Public Agency
LRT	Light Rail Transit
Lt or LT	Left
<u>M</u>	
m	meter
MADT	Monthly Average Daily Traffic
Maint	Maintenance
Max or MAX	Maximum
MAZEEP	Maintenance Zone Enhanced Enforcement Program
MBGR	Metal Beam Guard Rail
Med or MED	Median
MF	Mixed Flow
mi or MI	Mile or Miles
Min or MIN	Minimum
Misc or MISC	Miscellaneous
mm	Millimeter
mph or MPH	Miles per Hour
MPO	Metropolitan Planning Organization
MSL	Mean Sea Level
MT	Mass Transit
MTC	Metropolitan Transportation Commission (for the San Francisco Bay Area)
MUTCD	Manual on Uniform Traffic Control Devices
MVM	Per Million Vehicle Miles
<u>N</u>	
N	North
NB	Northbound
NCEES	National Council of Examiners for Engineering and Surveying
NCHRP	National Cooperative Highway Research Program
NCRP	National Cooperative Research Program

NCUT	National Committee on Urban Transportation
NCUTCD	National Committee on Uniform Traffic Control Devices
NCUTLO	National Committee on Uniform Traffic Laws and Ordinances
NHI	National Highway Institute
NHL	National Historic Landmark
NHS	National Highway System
NHSB	National Highway Safety Bureau
NHTSA	National Highway Traffic Safety Administration
NNIH	National Network of Interstate Highways
No.	Number (must have period)
Nos.	Numbers (must have period)
NPRM	Notice of Proposed Rule Making
NPS	National Park Service (U.S.)
NR	National Register (of Historic Places, abbreviation)
NRHP	National Register of Historic Places
NS	Near Side
NTS	National Transportation System or Not To Scale
NTSB	National Transportation Safety Board
<u>O</u>	
O & D	Origin and Destination
Oc or OC	Overcrossing
OCTA	Orange County Transportation Authority
ODA	Outdoor Advertising (Act)
OES	Office of Emergency Services
OG	Original Ground
OH	Overhead (Structure)
OHP	Office of Historic Preservation
Opp	Opposite
OSA	Office of the State Architect
OSHA	Occupational Safety and Health Administration
<u>P</u>	
P2P	Peer-to-Peer Program
P&P	Policy & Procedure
PCH	Pacific Coast Highway
PCMS	Portable Changeable Message Sign
PDO	Property Damage Only
PE	Professional Engineer or Project Engineer
Ped or PED	Pedestrian
PHF	Peak Hour Factor
PHI	Point of Historic Interest
PM	Post Mile
PMS	Pavement Management System
PMT	Passenger Miles Traveled
PS&E	Plans, Specifications, and Estimate
Pvmt or PVMT	Pavement
PUC	California Public Utilities Commission

<u>Q</u>	
Q&A	Questions and Answers
Qty	Quantity
<u>R</u>	
R&D	Research and Development
RCE	Registered Civil Engineer
Rd	Road
Rdwy	Roadway
RE	Resident Engineer or Right of Entry
ROW	Right of Way
RR	Railroad
Rt or RT	Right
Rte or RTE	Route or Registered Traffic Engineer
RV	Recreational Vehicle
R/W	Right of Way
Rwy	Railway
RXR	Railroad Crossing
<u>S</u>	
S&H Code	Streets & Highways Code
S	South
SACOG	Sacramento Area Council of Governments
SAFE	Service Authority for Freeways & Expressways
SB	Southbound or Senate Bill
SCAG	Southern California Association of Governments
SCRRA	Southern California Regional Rail Authority
SCRTD	Southern California Rapid Transit District
Sec	Second or Section
SHELL	State Highway Extra Legal Loads
SHL	State Historical Landmark
SHOPP	State Highway Operation and Protection Program
SHS	Standard Highway Signs Book (FHWA)
SI	Safety Index or International System of Units (Metric)
SR	State Route or Senate Resolution
SRRRA	Safety Roadside Rest Area
SSD	Stopping Sight Distance
SSP's	Standard Special Provisions
St or ST	Street
STA	State Transit Assistance
STIP	State Transportation Improvement Program
Str or STR	Structure
SW	Sidewalk or Soundwall
SWITRS	Statewide Integrated Traffic Records Systems
<u>I</u>	
TASAS	Traffic Accident Surveillance and Analysis System
TC	Traffic Control
TCM	Transportation Control Measure
TCP	Traffic/Transportation Control Plan

TEA21	Transportation Efficiency Act for the 21st Century
Temp or TEMP	Temporary
TI	Traffic Index
TM	Caltrans Traffic Manual
TMC	Traffic Management Center
TMP	Transportation Management Plan
TMT	Traffic Management Team
TODS	Tourist-Oriented Directional Signs
TOPD	Traffic Operations Policy Directives
TOS	Traffic Operations System
TRB	Transportation Research Board
TS	Traffic Signal
TSS	Caltrans Traffic Sign Specifications
TTC	Temporary Traffic Control
<u>U</u>	
UC	Under Crossing
UP	Underpass
UPRR	Union Pacific Railroad
URR	Urban Rail Transit Program (State)
USA	Underground Service Alert
USC	United States Code (Federal)
USCE	United States (Army) Corps of Engineers (Federal)
USDOT	United States Department of Transportation
<u>V</u>	
VMS	Variable Message Sign
VMT	Vehicle Miles Traveled
vph or VPH	Vehicles Per Hour
vphpl or VPHPL	Vehicles Per Hour Per Lane
<u>W</u>	
W	West or Width
WATCH	Work Area Traffic Control Handbook
WB	Westbound
WIM	Weigh-in Motion
WS	White Stripe
Wt	Weight
<u>X</u>	
Xing or XING	Crossing
<u>X</u>	
Yr	Year
YS	Yellow Stripe

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**APPENDIX A103(CA). LIST OF USEFUL TCD RELATED WEB SITES**

**Support:**

The following list of web sites are related to traffic control devices and provided for ease of use and as a handy reference:

Description	Internet Web Site Address
American Association of State Highway and Transportation Officials (AASHTO)	<a href="http://www.transportation.org/">http://www.transportation.org/</a>
American Railway Engineering and Maintenance-of-Way Association (AREMA)	<a href="http://www.arena.org/">http://www.arena.org/</a>
American Traffic Safety Services Association (ATSSA)	<a href="http://www.atssa.com">http://www.atssa.com</a>
California Building Standards Code	<a href="http://www.iccsafe.org/">http://www.iccsafe.org/</a>
California Code of Regulations (CCR)	<a href="http://ccr.oal.ca.gov/">http://ccr.oal.ca.gov/</a>
California Department of Motor Vehicles (DMV)	<a href="http://www.dmv.ca.gov/dmv.htm">http://www.dmv.ca.gov/dmv.htm</a>
California Highway Patrol	<a href="http://www.chp.ca.gov/">http://www.chp.ca.gov/</a>
California Law	<a href="http://www.leginfo.ca.gov/calaw.html">http://www.leginfo.ca.gov/calaw.html</a>
California MUTCD	<a href="http://www.dot.ca.gov/hq/traffops/signtech/mutcdsupp/">http://www.dot.ca.gov/hq/traffops/signtech/mutcdsupp/</a>
California Public Utilities Commission (CPUC)	<a href="http://www.cpuc.ca.gov/">http://www.cpuc.ca.gov/</a>
California Sign Chart	<a href="http://www.dot.ca.gov/hq/traffops/signtech/signdel/signchart.html">http://www.dot.ca.gov/hq/traffops/signtech/signdel/signchart.html</a>
California Traffic Control Devices Committee (CTCDC)	<a href="http://www.dot.ca.gov/hq/traffops/signtech/newtech/">http://www.dot.ca.gov/hq/traffops/signtech/newtech/</a>
California Vehicle Code	<a href="http://www.dmv.ca.gov/pubs/vctop/vcpdftoc.htm">http://www.dmv.ca.gov/pubs/vctop/vcpdftoc.htm</a>
Caltrans Approved Safety Devices List	<a href="http://www.dot.ca.gov/hq/esc/approved_products_list/HighwaySafe.htm">http://www.dot.ca.gov/hq/esc/approved_products_list/HighwaySafe.htm</a>
Caltrans Interchange Exit Numbering	<a href="http://www.dot.ca.gov/hq/traffops/signtech/calnexus/index.htm">http://www.dot.ca.gov/hq/traffops/signtech/calnexus/index.htm</a>
Caltrans Manuals	<a href="http://www.dot.ca.gov/manuals.htm">http://www.dot.ca.gov/manuals.htm</a>
Caltrans Office of Truck Services (STAA Truck Routes)	<a href="http://www.dot.ca.gov/hq/traffops/trucks/">http://www.dot.ca.gov/hq/traffops/trucks/</a>
Caltrans Publications	<a href="http://caltrans-opac.ca.gov/publicat.htm">http://caltrans-opac.ca.gov/publicat.htm</a>
Caltrans Rural/Urban Roadway Classification	<a href="http://www.dot.ca.gov/hq/tsip/hpms/Page1.php">http://www.dot.ca.gov/hq/tsip/hpms/Page1.php</a>
Caltrans Sign Specifications	<a href="http://www.dot.ca.gov/hq/traffops/signtech/signdel/specs.htm">http://www.dot.ca.gov/hq/traffops/signtech/signdel/specs.htm</a>
Caltrans Traffic Manual	<a href="http://www.dot.ca.gov/hq/traffops/signtech/signdel/trafficmanual.htm">http://www.dot.ca.gov/hq/traffops/signtech/signdel/trafficmanual.htm</a>

Description	Internet Web Site Address
Federal-Aid Highway Program Guidance on High Occupancy Vehicle (HOV) Lanes	<a href="http://www.fhwa.dot.gov/operations/hovguide01.htm">http://www.fhwa.dot.gov/operations/hovguide01.htm</a>
Federal Highway Administration	<a href="http://www.fhwa.dot.gov/">http://www.fhwa.dot.gov/</a>
Federal Railroad Administration	<a href="http://www.fra.dot.gov/">http://www.fra.dot.gov/</a>
FHWA's Experimentation/Interpretation Letters	<a href="http://www.atssa.com/page.wv?section=Resources&amp;name=Interpretation+Letters">http://www.atssa.com/page.wv?section=Resources&amp;name=Interpretation+Letters</a>
FHWA's MUTCD	<a href="http://mutcd.fhwa.dot.gov/">http://mutcd.fhwa.dot.gov/</a>
FHWA's Office of Safety	<a href="http://safety.fhwa.dot.gov/index.htm">http://safety.fhwa.dot.gov/index.htm</a>
FHWA's Standard Highway Signs Book	<a href="http://mutcd.fhwa.dot.gov/ser-shs_millennium.htm">http://mutcd.fhwa.dot.gov/ser-shs_millennium.htm</a>
Going Going Gone (Free Surplus Transportation Literature from UC Berkeley's ITS Tech Transfer)	<a href="http://www.techtransfer.berkeley.edu/freestuff/">http://www.techtransfer.berkeley.edu/freestuff/</a>
Illuminating Engineering Society (IES)	<a href="http://www.iesna.org/">http://www.iesna.org/</a>
Institute of Makers of Explosives	<a href="http://www.ime.org/">http://www.ime.org/</a>
Institute of Transportation Engineers (ITE)	<a href="http://www.ite.org">http://www.ite.org</a>
International Organization for Standards (ISO)	<a href="http://www.iso.org/">http://www.iso.org/</a>
International Safety Equipment Association (ISEA)	<a href="http://www.safetysafetyequipment.org/">http://www.safetysafetyequipment.org/</a>
National Committee on Uniform Traffic Control Devices (NCUTCD)	<a href="http://www.ncutcd.org">http://www.ncutcd.org</a>
National Committee on Uniform Traffic Laws and Ordinances (NCUTLO)	<a href="http://www.ncutlo.org">http://www.ncutlo.org</a>
Occupational Safety and Health Administration (OSHA)	<a href="http://www.osha.gov/">http://www.osha.gov/</a>
Tech Transfer Training: UC Berkeley Institute of Transportation Studies	<a href="http://www.techtransfer.berkeley.edu/training/index.php">http://www.techtransfer.berkeley.edu/training/index.php</a>
Transportation Research Board (TRB)	<a href="http://www.trb.org/">http://www.trb.org/</a>
U.S. Architectural and Transportation Barriers Compliance Board (The U.S. Access Board)	<a href="http://www.access-board.gov/">http://www.access-board.gov/</a>