



**Minnesota Manual
on
Uniform Traffic
Control Devices**

MN

MUTCD

July 2012

**MINNESOTA
MANUAL
ON
UNIFORM
TRAFFIC
CONTROL
DEVICES**



**MN
MUTCD**

July 2012



Minnesota Department of Transportation

Office of Traffic, Safety, and Operations

Mail Stop 725
1500 West County Road B2
Roseville, MN 55113

July 23, 2012

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TO: Holders of the 2011 Minnesota Manual on Uniform Traffic Control Devices (2011 MN MUTCD)

Transmitted herewith is Revision Number 1 (dated July, 2012) to the "2011 Minnesota Manual on Uniform Traffic Control Devices" (2011 MN MUTCD) as adopted by the Commissioner of the Minnesota Department of Transportation (MnDOT). The attached pages to the 2011 MN MUTCD incorporate changes or corrections brought about by changes in the FHWA MUTCD and Minnesota practices or procedures.

All revised pages are attached herewith and shall replace corresponding pages in this manual. The attached Commissioner's Order No. 93167 amends Commissioner's Order 92452. It is important to retain all Orders because they amend but do not replace previous Orders.

The 2011 MN MUTCD including Revision Number 1 is available on the Mn/DOT website at <http://www.dot.state.mn.us/trafficeng/publ/mutcd/index.html>. This manual will be updated annually, typically near the beginning of each calendar year. The latest version will be available on the website after it has been adopted by the Commissioner of Transportation.

Mn/DOT no longer maintains a mailing list for printed updates to this manual. Users of the the manual must fill out the "Updates Notification Form" found on the website above under "Quick Links." When an update/revision is made to the manual, an email will be sent out advising users to visit the website. The user must then download and print the revised pages and insert them into the printed version of their 2011 MN MUTCD.

To purchase additional copies of this manual or other State of Minnesota manuals call the Mn/DOT Map & Manual Sales Unit at 651-366-3017 for current costs and ordering information. They are located at the following address:

MnDOT Map & Manual Sales Unit
395 John Ireland Blvd. - MS 260
St. Paul, Minnesota 55155-1800

Comments regarding the content of the 2011 MN MUTCD should be referred to Janelle Anderson, MnDOT, Office of Traffic, Safety and Technology, phone (651) 234-7388, email address: janelle.anderson@state.mn.us.

Sincerely,

A handwritten signature in black ink that reads "Susan M. Groth".

Susan M. Groth, PE, PTOE
State Traffic Engineer

**REVISIONS TO THE
2011 MINNESOTA UNIFORM TRAFFIC CONTROL DEVICES MANUAL
ORDER NO. 93167**

The Commissioner of Transportation (Commissioner) has adopted the Minnesota Manual on Uniform Traffic Control Devices (MN MUTCD), dated December 15, 2011 establishing a uniform system of traffic control devices for streets and highways of the State of Minnesota as required by Minnesota Statutes, Section 169.06, Subdivision 1 (2011). Such uniform system shall correlate with and so far as possible conform to the current system as approved by the American Association of State Highway Officials and the national Manual on Uniform Traffic Control Devices (Federal MUTCD). (Minn. Stat. § 169.06, subd. 1 (2011); Federal Highway Administration, 23 C.F.R. § 655.603 (2011).)

A multi-agency committee has recommended the revisions and additions after reviewing changes in the 2009 Federal MUTCD.

Pursuant to Minnesota Statutes, Section 169.06, subd. 1 (2011), the Commissioner hereby adopts the revisions listed below as Record of Revisions or Additions to the MN MUTCD.

This Order revises Commissioner's Order 92452, dated December 15, 2011.

Record of Revisions or Additions to the MN MUTCD

Revision Number	Date Issued	Pages Revised or Added
1	7/15/12	v, viii, ix, 1a-l, 1A-4, 1A-28, 1A-29, 2A-i, 2A-5, 2A-18, 2B-1 thru 2B-6, 2B-8, 2B-11, 2B-15, 2B-34, 2B-35, 2B-38, 2B-41, 2B-45, 2B-46, 2B-51, 2B-53, 2B-56, 2B-57, 2C-3 thru 2C-5, 2C-11, 2C-13, 2C-17, 2C-18, 2C-20, 2C-21, 2C-24 thru 2C-28, 2C-30, 2C-34, 2D-23, 2D-27 thru 2D-29, 2E-6, 2E-33, 2E-37, 2E-41, 2E-51, 2F-6, 2G-2, 2G-11, 2G-16, 2I-2, 2I-5, 2I-9 thru 2I-11, 2I-13, 2J-5, 2M-1, 2M-2, 2M-9, 2M-15, 2N-2, 3B-27, 3B-35, 4D-1, 4D-39, 4D-46, 4E-3, 4E-5, 4E-6, 4F-3, 5B-2, 5C-2, 5C-3, 6D-1, 6D-2, 6D-4, 6E-1, 6F-3 thru 6F-5, 6F-7, 6F-16, 6F-18, 6F-20, 6F-21, 6F-29, 6F-37, 6F-41, 6F-52, 6G-1, 7A-i, 7B-1, 7B-5, 7B-6, 7B-9, 7B-11, 7C-1, 7D-1, 7E-a thru 7E-21, 8B-1 thru 8B-4, 8B-7 thru 8B-10, 8B-14, 8B-18, 8C-4, 8C-8, 8C-9, 9A-i, 9A-ii, 9B-2 thru 9B4, 9B-6, 9B-9, 9B-18, 9C-1, A2-1, C-1 thru C-10, C-13 thru C-70, C-73 thru C-86.

Dated at St. Paul, Minnesota, this 12th day of July, 2012.

A handwritten signature in black ink, appearing to read "Thomas K. Sorel". The signature is fluid and cursive, with a prominent horizontal stroke at the beginning.

Thomas K. Sorel
Commissioner of Transportation

2011 MINNESOTA UNIFORM TRAFFIC CONTROL DEVICES MANUAL ORDER NO. 92452

The Commissioner of Transportation (Commissioner) shall adopt a manual and specifications establishing a uniform system of traffic control devices for streets and highways of the State of Minnesota. Such uniform system shall correlate with and so far as possible conform to the current system as approved by the American Association of State Highway Officials and the national Manual on Uniform Traffic Control Devices (Federal MUTCD). (Minn. Stat. § 169.06, subd. 1 (2008); Federal Highway Administration, 23 C.F.R. § 655.603 (2008).)

A multi-agency committee has reviewed the 2009 Federal MUTCD, FHWA Guidelines on Retroreflective Sheeting Identification, and the 2005 Minnesota Manual on Uniform Traffic Control Devices as revised by Commissioner's Order No. 89453, dated January 2, 2007, 90038 dated February 15, 2008 and 90627 dated March 27, 2009 and recommended adding Appendices and revising or adding text and figures to make provisions for Minnesota Statutes and departmental procedures.

Pursuant to Minnesota Statutes, Section 169.06, subd. 1 (2008), the Commissioner hereby adopts the following as the 2011 Minnesota Manual on Uniform Traffic Control Devices.

MN Rev. 1

- I. Federal MUTCD, 2009 edition (dated January 15, 2010), and List of Known Errors (dated August 17, 2011).
- II. Minnesota Department of Transportation Appendices:
 - A. APPENDIX A1 - Congressional Legislation
 - B. APPENDIX A2 - Metric Conversions
 - C. APPENDIX A3 - Retroreflective Sheeting Identification Guidelines
 - C. APPENDIX B - Warrants, Standards, and Guidelines for traffic Control Devices used at Senior Citizen and Handicapped Pedestrian Crossings
 - D. APPENDIX C - Sign Listings & Recommended Sizes
- III. State of Minnesota, Department of Transportation, additional sections, revisions, and corrections to the 2009 Federal MUTCD.

It is further ordered that the provisions of the 2011 MN MUTCD shall be implemented and applied to all traffic control devices installed on or after January 1, 2012 upon highways within the State except for those traffic control devices which conform to the 2005 edition of the MN MUTCD with its 3 revisions and are on order or under contract prior to January 1, 2012. All existing traffic control devices or installations not in conformance with standards in the 2011 MN MUTCD shall be changed to conform to the new standards herein when replacement occurs.

This Order supersedes Commissioner's Order No. 88522, dated May 5, 2005 which adopted and prescribed the 2005 Minnesota Manual on Uniform Traffic Control Devices along with Commissioner's Order 89453 dated January 2, 2007, Commissioner's Order 90038 dated February 15, 2008, and as further revised by Commissioner's Order 90627 dated March 26, 2009.

Dated at St. Paul, Minnesota, this 15th day of December, 2011.

A handwritten signature in black ink, appearing to read "Thomas K. Sorel", with a long horizontal stroke above it.

Thomas K. Sorel
Commissioner of Transportation

Minnesota

Manual on Uniform Traffic Control Devices

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Year	Name	Commissioner's Order Number	Month/Day/Year of Adoption
1939	Manual on Uniform Traffic Control Devices for Streets and Highways of the State of Minnesota	12328	4/21/39
1949	Manual on Uniform Traffic Control Devices for Streets and Highways of the State of Minnesota	19270	3/22/49
1956	Manual on Uniform Traffic Control Devices for Streets and Highways of the State of Minnesota	25729	5/23/56
1962	Manual on Uniform Traffic Control Devices for Streets and Highways of the State of Minnesota	32517 49894 50987	2/16/62 9/15/71 4/21/72
1974	Minnesota Manual on Uniform Traffic Control Devices for Streets and Highways	54014	12/20/73
1986	Minnesota Manual on Uniform Traffic Control Devices for Streets and Highways (MN MUTCD)	70797 71787	4/15/86, 12/19/86
1991	Minnesota Manual on Uniform Traffic Control Devices for Streets and Highways (MN MUTCD)	77588 78988 79901 80748 80878 81551 82232 82843 83387 84240 85045	10/3/91 1/4/93 2/4/94 1/6/95 4/3/95 3/15/96 1/10/97 1/2/98 11/17/99 1/26/00 12/20/00
2001	Minnesota Manual on Uniform Traffic Control Devices (MN MUTCD)	86252 87127 87570	4/15/02 5/22/03 1/2/04
2005	Minnesota Manual on Uniform Traffic Control Devices (MN MUTCD)	88522 89453 90038 90627	5/5/05 1/2/07 2/15/08 3/26/09
2011	Minnesota Manual on Uniform Traffic Control Devices (MN MUTCD)	92952 93167	12/15/11 7/15/12

Table I-1a. Evolution of the Minnesota MUTCD

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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, highways, bikeways, and private roads open to public travel (see definition in Section 1A.13).

Throughout this Manual the headings Standard, Guidance, Option, and Support are used to classify the nature of the text that follows. Figures and tables, including the notes contained therein, 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 note contained therein.

STANDARD:

When used in this Manual, the text headings of Standard, Guidance, and Option shall be as defined in the first paragraph of Section 1A.13.

SUPPORT:

Throughout this Manual all dimensions and distances are provided in English units. Appendix A2 contains tables for converting each of the English unit numerical values that are used in this Manual to the equivalent Metric (International System of Units) values.

GUIDANCE:

If Metric units are to be used in laying out distances or determining sizes of devices, such units should be specified on plan drawings and made known to those responsible for designing, installing, or maintaining traffic control devices.

Except when a specific number is required or recommended by the text of a Section of the Manual, numerals displayed on the images of devices 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 devices, the numerals should be appropriately altered to fit the specific situation.

SUPPORT:

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

There are nine 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, Barricades and Gates. Sections are identified by the Chapter number and letter followed by a

decimal point and a number, such as Section 2B.3-Size of Regulatory Signs.

Each Section is comprised of one or more paragraphs. The paragraphs are indented but are not identified by a number. 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 40 feet beyond the stop line" that appears in Section 4D-14 of this Manual would be referenced in writing as "Section 4D.14, P7, D1, A.1," and would be verbally referenced as "Item A.1 of Paragraph 1 of Section 4D.14."

STANDARD:

In accordance with 23 CFR 655.603(b)(3), Minnesota shall revise the MN MUTCD to be in substantial conformance with changes to the National MUTCD within 2 years of the effective date of the Final Rule for the changes. Substantial conformance of such State or other Federal agency MUTCDs or Supplements shall be as defined in 23 CFR 655.603(b)(1).

After the adoption and issuance of a new edition of the MN MUTCD or a revision thereto new or reconstructed devices installed shall be in compliance with the new edition or revision.

In cases involving Federal-aid projects for new street, highway or bicycle trail construction or reconstruction, the traffic control devices installed (temporary or permanent) shall be in conformance with the most recent edition of the MN MUTCD before that highway is opened or re-opened to the public for unrestricted travel [23 CFR 655.603(d)(2) and (d)(3)].

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 MN 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 street, highway or bicycle trail construction or reconstruction, the traffic control devices installed (temporary or permanent) shall be in conformance with the most recent edition of the MN MUTCD before that highway is opened or re-opened to the public for unrestricted travel [23 CFR 655.603(d)(2)]. The FHWA and the State of Minnesota has the authority to establish other target compliance dates for implementation of particular changes to the MN MUTCD [23 CFR 655.603(d)(1)]. These target compliance dates shall be as shown in Table I-2.

In addition, the section, portion of a section or graphic which shall be in compliance for future dates shall be encased in a red box or continuation of a red box together with the compliance date which is also in red. That section, portion of a section, or graphic which shall have already been in compliance for past dates shall be encased in a red dashed box or continuation of a red box together with the compliance date which is also in red.

This user of this Manual is encouraged to refer to Table I-2 for further information.

OPTION:

A damaged, missing, or otherwise non-serviceable device that is non-compliant may be replaced in kind if engineering judgement indicates that:

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

Approved Revisions

This loose-leafed edition of the MN MUTCD incorporates all revisions which have been approved by the Federal Highway Administrator. This 2011 Edition of the MN MUTCD includes all official final rulings, interpretations, and modifications as of December 15, 2011.

A list of all official changes/revisions to this manual can be found in the Record of Revisions starting on page ix. As changes/revisions are made to each page, the revision number and date of revision will be added and so marked in the outside margin adjacent to the appropriate text or figure. The date at the bottom outside corner of each page indicates the date the official text revisions were distributed.

Symbols and Additions

This edition of the MN MUTCD continues the national trend set in the Federal MUTCD toward a broader use of symbols as alternatives to word messages. Also, the following new parts have been added to the MN MUTCD:

Appendix A1, Congressional Legislation

Appendix A2, Metric Conversions

Appendix A3, Retroreflective Sheeting
Identification Guide

Appendix B, Warrants, Standards, and Guidelines for
Traffic Control Devices used at Senior
Citizen and Handicapped Pedestrian
Crossings

Appendix C, Sign Listing

2011 MN MUTCD Section Number(s)	2011 MN MUTCD Section Title	Section	Compliance Date
2A.8	Maintaining Minimum Retroreflectivity	Implementation and continued use of an assessment or management method that is designed to maintain regulatory and warning sign retroreflectivity at or above the established minimum levels (see 1st Standard, 2nd paragraph)	June 13, 2014 *
2A.19	Lateral Offset	Crashworthiness of sign supports on roads with posted speed limit of 50 mph or higher (see 1st Standard, 2nd paragraph)	January 17, 2013 (date established in the 2000 FHWA MUTCD)
2B.40	ONE WAY Signs (R6-1 , R6-2)	New requirements in the 2009 FHWA MUTCD for the number and locations of ONE WAY signs (see 1st Standard, 4th paragraph; 2nd Standard, 3rd and 4th paragraphs)	December 31, 2019
2C.6 through 2C.14	Horizontal Alignment Warning Signs	Revised requirements in the 2009 FHWA MUTCD regarding the use of various horizontal alignment signs (see Table 2C-5)	December 31, 2019
2E.31, 2E.33, and 2E.36	Plaques for Left-Hand Exits	New requirement in the 2009 FHWA MUTCD to use E1-5aP and E1-5bP plaques for left-hand exits	December 31, 2014
4D.26	Yellow Change and Red Clearance Intervals	New requirement in the 2009 FHWA MUTCD that durations of yellow change and red clearance intervals shall be determined using engineering practices (see 1st Standard, 3rd paragraph; 2nd Standard)	June 13, 2017, or when timing adjustments are made to the individual intersection and/or corridor whichever comes first
4E.6	Pedestrian Intervals and Signal Phases	New requirement in the 2009 FHWA MUTCD that the pedestrian change interval shall not extend into the red clearance interval and shall be followed by a buffer interval of at least 3 seconds (1st Standard, 4th paragraph)	June 13, 2017, or when timing adjustments are made to the individual intersection and/or corridor whichever comes first
6D.3 **	Worker Safety Considerations	New requirement in the 2009 FHWA MUTCD that all workers within the right-of-way shall wear high-visibility apparel (1st Standard; 2nd Standard, 1st and 2nd paragraphs)	December 31, 2011
6E.2 **	High-Visibility Safety Apparel	New requirement in the 2009 FHWA MUTCD that all flaggers within the right-of-way shall wear high-visibility apparel	December 31, 2011
7D.4 **	Uniform of Adult Crossing Guards	New requirement in the 2009 FHWA MUTCD for high-visibility apparel for adult crossing guards	December 31, 2011
8B.4, 8B.4	Grade Crossing (Crossbuck) Signs and Supports	Retroreflective strip on Crossbuck sign and support (see Section 8B.3, 3rd Standard, 3rd paragraph and Section 8B.4, 3rd Standard and 4th Standard, 1st paragraph)	December 31, 2019
8B.4	Crossbuck Assemblies with YIELD or STOP Signs at Passive Grade Crossings	New requirement in the 2009 FHWA MUTCD for the use of STOP or YIELD signs with Crossbuck signs at passive grade crossings	December 31, 2019

* Types of signs other than regulatory or warning are to be added to an agency's management or assessment method as resources allow.

** FHWA MUTCD requirement is a result of a legislative mandate,

Note: All compliance dates that were previously published in Table I-2 of the 2009 FHWA MUTCD and 2011 MN MUTCD and that do not appear in this revised table have been eliminated.

Table I-2. Target Compliance Dates Established by the FHWA

RECORD OF REVISIONS OR ADDITIONS

Revision Number	Date Issued	Pages Revised or Added
1	12/15/2011 7/15/2012	Issued as a new manual v, viii, ix, 1A-i, 1A-4, 1A-28, 1A-29, 2A-i, 2A-5, 2A-18, 2B-1 thru 2B-6, 2B-8, 2B-11, 2B-15, 2B-34, 2B-35, 2B-38, 2B-41, 2B-45, 2B-46, 2B-51, 2B-53, 2B-56, 2B-57, 2C-3 thru 2C-5, 2C-11, 2C-13, 2C-17, 2C-18, 2C-20, 2C-21, 2C-24 thru 2C-28, 2C-30, 2C-34, 2D-23, 2D-27 thru 2D-29, 2E-6, 2E-33, 2E-37, 2E-41, 2E-51, 2F-6, 2G-2, 2G-11, 2G-16, 2I-2, 2I-5, 2I-9 thru 2I-11, 2I-13, 2J-5, 2M-1, 2M-2, 2M-9, 2M-15, 2N-2, 3B-27, 3B-35, 4D-1, 4D-39, 4D-46, 4E-3, 4E-5, 4E-6, 4F-3, 5B-2, 5C-2, 5C-3, 6D-1, 6D-2, 6D-4, 6E-1, 6F-3 thru 6F-5, 6F-7, 6F-16, 6F-18, 6F-20, 6F-21, 6F-29, 6F-37, 6F-41, 6F-52, 6G-1, 7A-i, 7B-1, 7B-5, 7B-6, 7B-9, 7B-11, 7C-1, 7D-1, 7E-a thru 7E-21, 8B-1 thru 8B-4, 8B-7 thru 8B-10, 8B-14, 8B-18, 8C-4, 8C-8, 8C-9, 9A-i, 9A-ii, 9B-2 thru 9B4, 9B-6, 9B-9, 9B-18, 9C-1, A2-1, C-1 thru C-10, C-13 thru C-70, C-73 thru 86.

PART 1. GENERAL

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Subdivision 2. Placement and maintenance on trunk highways.

“(a) The commissioner shall place and maintain such traffic-control devices, conforming to the manual and specifications, upon all state trunk highways as the commissioner shall deem necessary to indicate and to carry out the provisions of this chapter (Chapter 169) or to regulate, warn, or guide traffic. The commissioner may construct and maintain signs at the entrance of each city, which sign shall have placed thereon the name of the city and the population thereof. The commissioner may construct and maintain other directional signs upon the trunk highways and such signs shall be uniform. ...”

“(b) No other authority shall place or maintain any traffic control device upon any highway under the jurisdiction of the commissioner except by the latter’s permission.”

Subdivision 3. Placement and maintenance by local authority.

“Local authorities in their respective jurisdictions shall place and maintain such traffic-control devices upon highways under their jurisdiction as they may deem necessary to indicate and to carry out the provisions of this chapter (Chapter 169) or local traffic ordinances, or to regulate, warn, or guide traffic. All such traffic-control devices hereafter erected shall conform to the state manual and specifications.”

SUPPORT:

The Introduction of this Manual contains information regarding the meaning of substantial conformance and the applicability of the MUTCD to private roads open to public travel.

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."

SUPPORT:

The National MUTCD has also been adopted by the National Park Service, the U.S. Forest Service, the U.S.

Military Command, the Bureau of Indian Affairs, the Bureau of Land Management, and the U.S. Fish and Wildlife Service.

GUIDANCE:

States should 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."

1A.8 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, or, in the case of private roads open to public travel, by the private owner or private 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 or, in the case of private roads open to public travel, the private owner or private official having jurisdiction, 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.

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

The following excerpt from Chapter 169, Minnesota Statutes, set forth the responsibilities for all road authorities for a uniform application of Chapter 169.

169.022. Uniform application.

"The provisions of this chapter (Chapter 169) shall be applicable and uniform throughout this state and in all political subdivisions and municipalities therein, and no local authority shall enact or enforce any rule or regulation in conflict with the provisions of this chapter unless expressly authorized herein. Local authorities may adopt traffic regulations which are not in conflict with the provisions of this chapter; provided, that when any local ordinance regulating traffic covers the same subject for which a penalty is provided for in this chapter (Chapter 169), then the penalty provided for violation of said local ordinance shall be identical with the penalty provided for in this chapter for the same offense."

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.

Although some highway design features, such as curbs, median barriers, guardrails, speed humps or tables, and textured pavement, have a significant impact on traffic operations and safety, they are not considered to be traffic control devices and provisions regarding their design and use are generally not included in this Manual.

Certain types of signs and other devices that do not have any traffic control purpose are sometimes placed within the highway right-of-way by or with the permission of the public agency or the official having jurisdiction over the street or highway. Most of these signs and other devices are not intended for use by road users in general, and their message is only important to individuals who have been instructed in their meanings. These signs and other devices are not considered to be traffic control devices and provisions regarding their design and use are not included in this Manual. Among these signs and other devices are the following:

- A. Devices whose purpose is to assist highway maintenance personnel. Examples include markers to guide snowplow operators, devices that identify culvert and drop inlet locations, and devices that precisely identify highway locations for maintenance or mowing purposes.
- B. Devices whose purpose is to assist fire or law enforcement personnel. Examples include markers that identify fire hydrant locations, signs that identify fire or water district boundaries, speed measurement pavement markings, small indicator lights to assist in enforcement of red light violations, and photo enforcement systems.
- C. Devices whose purpose is to assist utility company personnel and highway contractors, such as markers that identify underground utility locations.
- D. Signs posting local non-traffic ordinances.
- E. Signs giving civic organization meeting information.

STANDARD:

Signs and other devices that do not have any traffic control purpose that are placed within the highway right-of-way shall not be located where they will interfere with, or detract from, traffic control devices.

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.

1A.9 Engineering Study and Engineering Judgment

SUPPORT:

Definitions of an engineering study and engineering judgment are contained in Section 1A.13.

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 of traffic control devices, as well as in the location and design of roads and streets that the devices complement.

Early in the processes of location and design of roads and streets, engineers should coordinate such location and design with the design and placement of the traffic control devices to be used with such roads and streets.

Jurisdictions, or owners of private roads open to public travel, with responsibility for traffic control that do not have engineers on their staffs who are trained and/or experienced in traffic control devices should seek engineering assistance from others, such as the State transportation agency, their county, a nearby large city, or a traffic engineering consultant.

SUPPORT:

As part of the Federal-aid Program, each State is required to have a Local Technical Assistance Program (LTAP) and to provide technical assistance to local highway agencies. Requisite technical training in the application of the principles of the MUTCD is available from the State's Local Technical Assistance Program for needed engineering guidance and assistance.

GUIDANCE:

The abbreviations for the words listed in Table 1A-2 that also show a prompt word should not be used on a portable changeable message sign unless the prompt word shown in Table 1A-2 either precedes or follows the abbreviation, as applicable.

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:

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

Except as otherwise provided in Table 1A-1 or 1A-2 or unless necessary to avoid confusion, periods, commas, apostrophes, question marks, ampersands, and other punctuation marks or characters that are not letters or numerals should not be used in any abbreviation.

Word Message	Standard Abbreviation
Afternoon / Evening	PM
Alternate	ALT
AM radio	AM
Avenue	AVE, AV
Bicycle	BIKE
Boulevard	BLVD*
Bridge	(See Table 1A-2)
CB Radio	CB
Center (as part of a place name)	CTR
Circle	CIR*
Civil Defense	CD
Compressed Natural Gas	CNG
Court	CT*
Crossing (other than highway-rail)	X-ING
Drive	DR*
East	E
Electric Vehicle	EV
Expressway	EXPWY*
Feet	FT
FM Radio	FM
Freeway	FRWY, FWY*
Friday	FRI
Hazardous Material	HAZMAT
High Occupancy Vehicle	HOV
Highway	HWY*
Hospital	HOSP
Hour(s)	HR, HRS
Information	INFO
Inherently Low Emission Vehicle	ILEV
International	INTL
Interstate	(See Table 1A-2)
Junction/Intersection	JCT
Lane	(See Table 1A-2)
Miles Per Hour	MPH
Liquid Propane Gas	LP-GAS
Maximum	MAX

Word Message	Standard Abbreviation
Mile(s)	MI
Miles Per Hour	MPH
Minimum	MIN
Minute(s)	MIN
Monday	MON
Morning / Late Night	AM
Mount	MT
Mountain	MTN
National	NATL
North	N
Parkway	PKWY*
Pedestrian	PED
Place	PL*
Pounds	LBS
Road	RD*
Saint	ST
Saturday	SAT
South	S
State, county, or other non-US or non-Interstate numbered route	(See Table 1A-2)
Street	ST*
Sunday	SUN
Telephone	PHONE
Temporary	TEMP
Terrace	TER*
Thursday	THUR
Thruway	THWY*
Tons of Weight	T
Trail	TR*
Tuesday	TUE
Turnpike	TPK*
Two-Way Intersection	2-WAY
US Numbered Route	(See Table 1A-2)
Wednesday	WED
West	W

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* This abbreviation shall not be used for any application other than the name of a roadway

Table 1A-1 Acceptable Abbreviations

Word Message	Standard Abbreviation	Prompt Word that should Precede the Abbreviation	Prompt Word that should Follow the Abbreviation
Access	ACCS	----	Road
Ahead	AHD	Fog	----
Blocked	BLKD	Lane	----
Bridge	BRDG	[Name]*	----
Cannot	CANT	----	----
Center	CNTR	----	Lane
Chemical	CHEM	----	Spill
Condition	COND	Traffic	----
Congested	CONG	Traffic	----
Construction	CONST	----	Ahead
Crossing	XING	----	----
Do Not	DONT	----	----
Downtown	DWNTN	----	Traffic
Eastbound	E-BND	----	----
Emergency	EMER	----	----
Entrance, Enter	ENT	----	----
Exit	EX	Next	----
Express	EXP	----	Lane
Frontage	FRNTG	----	Road
Hazardous	HAZ	----	Driving
Highway-Rail Grade Crossing	RR XING	----	----
Interstate	I-*	----	[Number]
It Is	ITS	----	----
Lane	LN	(Roadway Name)*, Right, Left, Center	----
Left	LFT	----	----
Local	LOC	----	Traffic
Lower	LWR	----	Level
Maintenance	MAINT	----	----
Major	MAJ	----	Accident
Minor	MNR	----	Accident
Normal	NORM	----	----
Northbound	N-BND	----	----
Oversized	OVRSZ	----	Load
Parking	PKNG	----	----
Pavement	PVMT	Wet	----
Prepare	PREP	----	To Stop
Quality	QLTY	Air	----
Right	RT	Keep, Next	----
Right	RT	----	Lane
Roadwork	RDWK	----	Ahead (Distance)
Route	RT, RTE	Best	----
Service	SERV	----	----
Shoulder	SHLDR	----	----
Slippery	SLIP	----	----
Southbound	S-BND	----	----
Speed	SPD	----	----
State, county, or other non-US or non-Interstate numbered route	(Route Abbreviation determined by highway agency)*	----	(Number)**
Tires With Lugs	LUGS	----	----
Traffic	TRAF	----	----
Travelers	TRVLRS	----	----
Two-Wheeled Vehicles	CYCLES	----	----
Upper	UPR	----	Level
US Numbered Routs	US	----	(Number) **
Vehicle(s)	VEH, VEHS	----	----
Warning	WARN	----	----
Westbound	W-BND	----	----
Will Not	WONT	----	----

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* This abbreviation when accompanied by the prompt word, may be used on traffic control devices other than portable changeable message signs.

** A space and no dash shall be placed between the abbreviation and the number of the route.

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

Abbreviation	Intended Word	Common Misinterpretations
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

Table 1A-3. Unacceptable Abbreviations

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2A.8 Maintaining Minimum Retroreflectivity

SUPPORT:

Retroreflectivity is one of several factors associated with maintaining nighttime sign visibility (see Section 2A.22).

STANDARD:

Public agencies or officials having jurisdiction shall use an assessment or management method that is designed to maintain sign retroreflectivity at or above the minimum levels in Table 2A-3.

Compliance Date: June 13, 2014

SUPPORT:

Compliance with the above Standard is achieved by having a method in place and using the method to maintain the minimum levels established in Table 2A-3. Provided that an assessment or management method is being used, an agency or official having jurisdiction would be in compliance with the above Standard even if there are some individual signs that do not meet the minimum retroreflectivity levels at a particular point in time.

GUIDANCE:

Except for those signs specifically identified in the following Option, one or more of the following assessment or management methods should be used to maintain sign retroreflectivity:

- A. Visual Nighttime Inspection – The retroreflectivity of an existing sign is assessed by a trained sign inspector conducting a visual inspection from a moving vehicle during nighttime conditions. Signs that are visually identified by the inspector to have retroreflectivity below the minimum levels should be replaced.
- B. Measured Sign Retroreflectivity – Sign retroreflectivity is measured using a retroreflectometer. Signs with retroreflectivity below the minimum levels should be replaced.
- C. Expected Sign Life – When signs are installed, the installation date is labeled or recorded so that the age of a sign is known. The age of the sign is compared to the expected sign life. The expected sign life is based on the experience of sign retroreflectivity degradation in a geographic area compared to the minimum levels. Signs older than the expected life should be replaced.

D. Blanket Replacement – All signs in an area/corridor, or of a given type, should be replaced at specified intervals. This eliminates the need to assess retroreflectivity or track the life of individual signs. The replacement interval is based on the expected sign life, compared to the minimum levels, for the shortest life material used on the affected signs.

E. Control Signs – Replacement of signs in the field is based on the performance of a sample of control signs. The control signs might be a small sample located in a maintenance yard or a sample of signs in the field. The control signs are monitored to determine the end of retroreflective life for the associated signs. All field signs represented by the control sample should be replaced before the retroreflectivity levels of the control sample reach the minimum levels.

F. Other Methods – Other methods developed based on engineering studies can be used.

SUPPORT:

Additional information about these methods is contained in the 2007 Edition of FHWA's "Maintaining Traffic Sign Retroreflectivity" (see Section 1A.11).

OPTION:

Highway agencies may exclude the following signs from the retroreflectivity maintenance guidelines described in this Section:

- A. Parking, Standing, and Stopping signs (R7 and R8 series)
- B. Walking/Hitchhiking/Crossing signs (R9 series, R10-1 through R10-4b)
- C. Acknowledgment signs, including Memorial signs
- D. All signs with blue or brown backgrounds
- E. Bikeway signs that are intended for exclusive use by bicyclists or pedestrians

2A.9 Shapes

STANDARD:

Particular shapes, as shown in Table 2A-4, shall be used exclusively for specific signs or series of signs, unless otherwise provided in the text discussion in this Manual for a particular sign or class of signs.

2A.10 Sign Colors

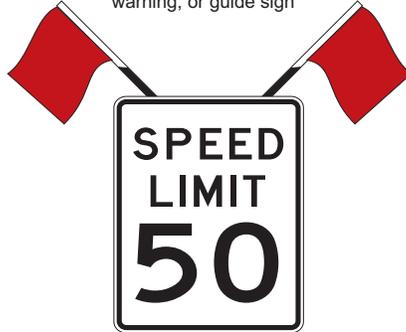
STANDARD:

The colors to be used on standard signs and their specific use on these signs shall be as provided in the applicable Sections of this Manual. The color coordinates and values shall be as described in 23 CFR, Part 655, Subpart F, Appendix.

A - W16-15P plaque above a regulatory or warning sign if the regulation or condition is new



B - Red or orange flags above a regulatory, warning, or guide sign



C - W16-18P plaque above a regulatory sign



D - Solid yellow, solid fluorescent yellow, or diagonally striped black and yellow (or black and fluorescent yellow) strip of retroreflective sheeting around a warning sign



E - Vertical retroreflective strip on sign support



F - Supplemental beacon

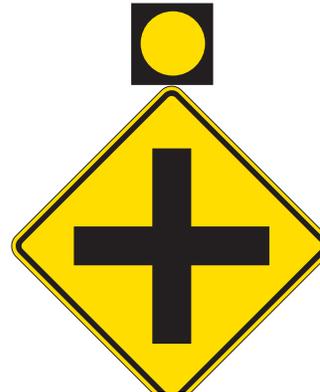


Table 2A-1 Illumination of Sign Elements

Means of Retroreflection	Sign Element
Reflector “buttons” or similar units	Symbol Word message Border
A material that has a smooth, sealed outer surface over a microstructure that reflects light	Symbol Word message Border Background

Table 2A-2 Retroreflection of Sign Elements

GUIDANCE:

In urban areas where crosswalks exist, signs should not be placed within 4 feet in advance of the crosswalk (see Drawing D in Figure 2A-3).

2A.17 Overhead Sign Installations**GUIDANCE:**

Overhead signs should be used on freeways and expressways, where some degree of lane-use control is desirable, or where space is not available at the roadside.

SUPPORT:

The operational requirements of the present highway system are such that overhead signs have value at many locations. The factors to be considered for the installation of overhead sign displays are not definable in specific numerical terms.

OPTION:

The following conditions (not in priority order) may be considered in an engineering study to determine if overhead signs would be beneficial:

- A. Traffic volume at or near capacity;
- B. Complex interchange design;
- C. Three or more lanes in each direction;
- D. Restricted sight distance;
- E. Closely spaced interchanges;
- F. Multi-lane exits;
- G. Large percentage of trucks;
- H. Street lighting background;
- I. High-speed traffic;
- J. Consistency of sign message location through a series of interchanges;
- K. Insufficient space for post-mounted signs;
- L. Junction of two freeways; and
- M. Left exit ramps.

Over-crossing structures may be used to support overhead signs.

SUPPORT:

Under some circumstances, the use of over-crossing structures as sign supports might be the only practical solution that will provide adequate viewing distance. The use of such structures as sign supports might eliminate the need for the foundations and sign supports along the roadside.

2A.18 Mounting Height**STANDARD:**

The provisions of this Section shall apply unless specifically stated otherwise for a particular sign elsewhere in this Manual.

SUPPORT:

The mounting height requirements for object markers are provided in Chapter 2C.

In addition to the provisions of this Section, information affecting the minimum mounting height of signs as a function of crash performance can be found in AASHTO's "Roadside Design Guide" (see Section 1A.11).

STANDARD:

The minimum height, measured vertically from the bottom of the sign to the elevation of the near edge of the pavement, of signs installed at the side of the road in rural areas shall be 5 feet (see Figure 2A-2).

The minimum height, measured vertically from the bottom of the sign to the top of the curb, or in the absence of curb, measured vertically from the bottom of the sign to the elevation of the near edge of the traveled way, of signs installed at the side of the road in business, commercial, or residential areas where parking or pedestrian movements are likely to occur **directly below the sign**, or where the view of the sign might be obstructed, shall be 7 feet (see Figure 2A-2).

The minimum height, measured vertically from the bottom of the sign to the sidewalk, of signs installed above sidewalks shall be 7 feet. If the bottom of a secondary sign that is mounted below another sign is mounted lower than 7 feet above a pedestrian sidewalk or pathway (see Section 6D.02), the secondary sign shall not project more than 4 inches into the pedestrian facility (see Figure 2A-2, Example C).

Directional signs on freeways and expressways shall be installed with a minimum height of 7 feet, measured vertically from the bottom of the sign to the elevation of the near edge of the pavement. All route signs, warning signs, and regulatory signs on freeways and expressways shall be installed with a minimum height of 7 feet, measured vertically from the bottom of the sign to the elevation of the near edge of the pavement. If a secondary sign is mounted below another sign on a freeway or expressway, the major sign shall be installed with a minimum height of 8 feet and the secondary sign shall be installed with a minimum height of 5 feet, measured vertically from the bottom of the sign to the elevation of the near edge of the pavement.

Where large signs having an area exceeding 50 square feet are installed on multiple breakaway posts, the clearance from the ground to the bottom of the sign shall be at least 7 feet.

OPTION:

The height to the bottom of a secondary sign mounted below another sign may be 1 foot less than the height specified above.

Signs that are placed 30 feet or more from the edge of the traveled way may be installed with a minimum height of 5 feet, measured vertically from the bottom of the sign to the elevation of the near edge of the pavement.

A route sign assembly consisting of a route sign and auxiliary signs (see Section 2D.12) may be treated as a single sign for the purposes of this Section.

The mounting height may be adjusted when supports are located near the edge of the right-of-way on a steep backslope in order to avoid the sometimes less desirable alternative of placing the sign closer to the roadway.

STANDARD:

Overhead mounted signs shall provide a vertical clearance of not less than 17 feet to the sign, light fixture, or sign bridge, over the entire width of the pavement and shoulders except where a lesser vertical clearance is used for the design of other structures.

OPTION:

If the vertical clearance of other structures along the roadway near the sign structure is less than 16 feet, the vertical clearance to an overhead sign structure or support may be as low as 1 foot higher than the vertical clearance of the other structures in order to improve the visibility of the overhead signs.

In special cases it may be necessary to reduce the clearance to overhead signs because of substandard dimensions in tunnels and other major structures such as double-deck bridges.

SUPPORT:

Figure 2A-2 illustrates some of the mounting height requirements contained in this Section.

2A.19 Lateral Offset

STANDARD:

For overhead sign supports, the minimum lateral offset from the edge of the shoulder (or if no shoulder exists, from the edge of the pavement) to the near edge of overhead sign supports (cantilever or sign bridges) shall be 6 feet.

Overhead sign supports shall have a barrier or crash cushion to shield them if they are within the clear zone.

Post-mounted sign and object marker supports shall be crashworthy (breakaway, yielding, or shielded with a longitudinal barrier or crash cushion) if within the clear zone.

Compliance Date: January 17, 2013

GUIDANCE:

For post-mounted signs, the minimum lateral offset should be 12 feet from the edge of the travel way. If a paved shoulder wider than 6 feet exists, the minimum lateral offset for post-mounted signs should be 6 feet from the edge of the shoulder.

SUPPORT:

The minimum lateral offset requirements for object markers are provided in Chapter 2C.

The minimum lateral offset is intended to keep trucks and cars that use the shoulders from striking the signs or supports.

GUIDANCE:

All supports should be located as far as practical from the edge of the shoulder. Advantage should be taken to place signs behind existing roadside barriers, on over-crossing structures, or other locations that minimize the exposure of the traffic to sign supports.

SUPPORT:

Where permitted, signs may be placed on existing supports used for other purposes, such as highway traffic signal supports, highway lighting supports, and utility poles.

STANDARD:

If signs are placed on existing supports, they shall meet other placement criteria contained in this Manual.

OPTION:

Lesser lateral offsets may be used on connecting roadways or ramps at interchanges, but not less than 6 feet from the edge of the traveled way.

On conventional roads in areas where it is impractical to locate a sign with the lateral offset prescribed by this Section, a lateral offset of at least 2 feet may be used.

A lateral offset of at least 1 foot from the face of the curb may be used in business, commercial or residential areas where sidewalk width is limited or where existing poles are close to the curb.

Chapter 2B. REGULATORY SIGNS

2B.1 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 (see Section 2A.7) to show the same shape and similar color by both day and night, unless specifically stated otherwise in the text discussion in this Manual for a particular sign or group of signs.

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

SUPPORT:

Section 1A.9 contains information regarding the assistance that is available to jurisdictions that do not have engineers on their staffs who are trained and/or experienced in traffic control devices.

2B.2 Design of Regulatory Signs

STANDARD:

Regulatory signs shall be rectangular unless specifically designated otherwise. Regulatory signs shall be designed in accordance with the sizes, shapes, colors, and legends contained in the "Standard Highway Signs and Markings" book (see Section 1A.11).

OPTION:

Regulatory word message signs other than those classified and specified in this Manual and the "Standard Highways Signs and Markings" book (see Section 1A.11) may be developed to aid the enforcement of other laws or regulations.

Except for symbols on regulatory signs, minor modifications may be made to the design provided that the essential appearance characteristics are met.

SUPPORT:

The use of educational plaques to supplement symbol signs is described in Section 2A.12.

Most regulatory signs are rectangular, with the longer dimension vertical. The shapes and colors of regulatory signs are listed in Tables 2A-4 and 2A-5, 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.

2B.3 Size of Regulatory Signs

STANDARD:

Except as provided in Section 2A.11, the sizes for regulatory signs shall be as shown in Table 2B-1 and in Appendix C at the back of this Manual.

SUPPORT:

Section 2A.11 contains information regarding the applicability of the various columns in Table 2B-1.

Section 1A.13 contains information regarding the definitions of multi-lane street or highway and multi-lane approach with respect to inclusion of turning lanes.

STANDARD:

Except as provided in the following Option, the minimum sizes for regulatory signs facing traffic on multi-lane conventional roads shall be as shown in the Multi-lane column of Table 2B-1.

OPTION:

Where the posted speed limit is 35 mph or less on a multi-lane highway or street, other than for a STOP sign, the minimum size shown in the Single Lane column in Table 2B-1 may be used.

Sign or Plaque	Sign Designation	Section	Conventional Road		Expressway	Freeway	Minimum	Oversized
			Single Lane	Multi-Lane				
Stop	R1-1	2B.5	30 x 30	36 x 36	36 x 36	---	30 x 30*	48 x 48
Yield	R1-2	2B.8	36 x 36 x 36	48 x 48 x 48	48 x 48 x 48	60 x 60 x 60	30 x 30 x 30*	---
To Oncoming Traffic (plaque)	R1-2aP	2B.10	24 x 18	24 x 18	36 x 30	48 x 36	24 x 18	---
All Way (plaque)	R1-3P	2B.5	18 x 6	18 x 6	---	---	---	30 x 12
Stop Here for Peds	R1-5b	2B.11	---	36 x 36	---	---	---	36 x 36
Stop Here for Pedestrians	R1-5c	2B.11	---	36 x 36	---	---	---	36 x 48
In-Street Ped Crossing	R1-6a,b,c	2B.12	12 x 36	12 x 36	---	---	---	---
Overhead Ped Crossing	R1-9a	2B.12	90 x 24	90 x 24	---	---	---	---
Overhead Stop for Ped	R1-9b	2B.12	90 x 30	90 x 30	---	---	---	---
Except Right Turn (plaque)	R1-10P	2B.5	24 x 18	24 x 18	---	---	---	---
Speed Limit	R2-1	2B.13	24 x 30	30 x 36	36 x 48	48 x 60	18 x 24	30 x 36
Truck Speed Limit (plaque)	R2-2P	2B.14	24 x 24	24 x 24	36 x 36	48 x 48	---	36 x 36
Night Speed Limit (plaque)	R2-3P	2B.15	24 x 24	24 x 24	36 x 36	48 x 48	---	36 x 36
Minimum Speed Limit (plaque)	R2-4P	2B.16	24 x 30	24 x 30	36 x 48	48 x 60	---	36 x 48
Combined Speed Limit	R2-4b	2B.16	24 x 48	24 x 48	36 x 72	48 x 96	---	36 x 72
End XX Mile Speed Limit	R2-6b	2B.16.1	24 x 30	24 x 30	---	---	---	---
End Work Speed Zone	R2-6c	2B.16.2	24 x 30	24 x 30	24 x 30	24 x 30	---	---
Fines Higher (plaque)	R2-6P	2B.17	24 x 18	24 x 18	36 x 24	48 x 36	---	36 x 24
Begin Higher Fines Zone	R2-10	2B.17	24 x 30	36 x 48	36 x 48	48 x 60	---	36 x 48
End Higher Fines Zone	R2-11	2B.17	24 x 30	36 x 48	36 x 48	48 x 60	---	36 x 48
Bridge Speed Limit	R2-X5	2B.13.1	24 x 36	24 x 36	---	---	---	---
Movement Prohibition	R3-1,2,3, 4,18,27	2B.18	24 x 24	36 x 36	36 x 36	---	---	48 x 48
Mandatory Movement Lane Control	R3-5, 5a	2B.20	30 x 36	30 x 36	---	---	---	---
Left Lane (plaque)	R3-5bP	2B.20	30 x 12	30 x 12	---	---	---	---
HOV 2+ (plaque)	R3-5cP	2B.20	24 x 12	24 x 12	---	---	---	---
Taxi Lane (plaque)	R3-5dP	2B.20	30 x 12	30 x 12	---	---	---	---
Center Lane (plaque)	R3-5eP	2B.20	30 x 12	30 x 12	---	---	---	---
Right Lane (plaque)	R3-5fP	2B.20	30 x 12	30 x 12	---	---	---	---
Bus Lane (plaque)	R3-5gP	2B.20	30 x 12	30 x 12	---	---	---	---
Optional Movement Lane Control	R3-6	2B.21	30 x 36	30 x 36	---	---	---	---
Right (Left) Lane Must Turn Right (Left)	R3-7	2B.20	30 x 30*	36 x 36	---	---	---	---
Two-Way Left Turn Only (overhead)	R3-9a	2B.24	30 x 36	30 x 36	---	---	---	---
Two-Way Left Turn Only (post-mounted)	R3-9b	2B.24	24 x 36	24 x 36	---	---	---	36 x 48
BEGIN	R3-9cP	2B.25	30 x 12	30 x 12	---	---	---	---
END	R3-9dP	2B.25	30 x 12	30 x 12	---	---	---	---
Reversible Lane Control (symbol)	R3-9e	2B.26	108 x 48	108 x 48	---	---	---	---
Reversible Lane Control (post-mounted)	R3-9f	2B.26	30 x 42	36 x 54	---	---	---	---
Advance Reversible Lane Control	R3-9g,9h	2B.26	108 x 36	108 x 36	---	---	---	---
Transition Signing								
End Reverse Curve	R3-9i	2B.26	108 x 48	108 x 48	---	---	---	---
All Turns (U Turn) from Right Lane	R3-23,23a	2B.27	60 x 36	60 x 36	---	---	---	---
All Turns (U Turn) with Arrow	R3-24,24b, 25,25b,26a	2B.27	72 x 18	72 x 18	---	---	---	---
U and Left Turns with Arrow	R3-24a,25a,26	2B.27	60 x 24	60 x 24	---	---	---	---

Table 2B-1. Regulatory Sign and Plaque Sizes (Sheet 1 of 5)

Sign or Plaque	Sign Designation	Section	Conventional Road		Expressway	Freeway	Minimum	Oversized
			Single Lane	Multi-Lane				
Advance Intersection Lane Control	R3-30 series	2B.22	Varies x 30	Varies x 30	---	---	---	Varies x 30
Right Lane Must Exit	R3-33	2B.23	---	---	78 x 36	78 x 36	---	---
Do Not Pass	R4-1	2B.28	24 x 30	24 x 30	36 x 48	48 x 60	18 x 24*	36 x 48
Pass With Care	R4-2	2B.29	24 x 30	24 x 30	36 x 48	48 x 60	18 x 24*	36 x 48
Slower Traffic Keep Right	R4-3	2B.30	24 x 30	24 x 30	36 x 48	48 x 60	18 x 24*	36 x 48
Trucks Use Right Lane	R4-5	2B.31	24 x 30	24 x 30	36 x 48	48 x 60	---	36 x 48
Keep Right	R4-7,7a,7b	2B.32	24 x 30	24 x 30	36 x 48	48 x 60	18 x 24*	36 x 48
Narrow Keep Right	R4-7c	2B.32	18 x 30	18 x 30	---	---	---	---
Keep Left	R4-8,8a,8b	2B.32	24 x 30	24 x 30	36 x 48	48 x 60	18 x 24	36 x 48
Narrow Keep Left	R4-8c	2B.32	18 x 30	18 x 30	---	---	---	---
Stay in Lane	R4-9	2B.33	24 x 30	24 x 30	36 x 48	48 x 60	18 x 24	36 x 48
Runaway Vehicles Only	R4-10	2B.34	48 x 48	48 x 48	---	---	---	---
Slow Vehicles with XX or More Following Vehicles Must Use Turn-Out	R4-12	2B.35	42 x 24	42 x 24	---	---	---	---
Slow Vehicles Must Use Turn-Out Ahead	R4-13	2B.35	42 x 24	42 x 24	---	---	---	---
Slow Vehicles Must Turn Out	R4-14	2B.35	30 x 42	30 x 42	---	---	---	---
Keep Right Except to Pass	R4-16	2B.30	24 x 30	24 x 30	36 x 48	48 x 60	18 x 24*	36 x 48
No Driving on Shoulder	R4-17a	2B.36	30 x 36	30 x 36	48 x 54	48 x 54	---	---
No Passing on Shoulder	R4-18a	2B.36	30 x 36	30 x 36	48 x 54	48 x 54	---	---
Do Not Enter	R5-1	2B.37	30 x 30	36 x 36	36 x 36	48 x 48	---	36 x 36
Wrong Way	R5-1a	2B.38	36 x 24	42 x 30	36 x 24*	42 x 30	30 x 18*	42 x 30
No Trucks	R5-2,2a	2B.39	24 x 24	24 x 24	30 x 30	36 x 36	---	36 x 36
No Motor Vehicles	R5-3	2B.39	24 x 24	24 x 24	---	---	24 x 24	---
No Commercial Vehicles	R5-4	2B.39	24 x 30	24 x 30	36 x 48	36 x 48	---	---
No Vehicles with Lugs	R5-5	2B.39	24 x 30	24 x 30	36 x 48	48 x 60	---	---
No Bicycles	R5-6	2B.39	24 x 24	24 x 24	30 x 30	36 x 36	24 x 24*	48 x 48
No Non-Motorized Vehicles	R5-7	2B.39	30 x 24	30 x 24	42 x 24	48 x 30	---	42 x 24
No Motor-Driven Cycles	R5-8	2B.39	30 x 24	30 x 24	42 x 24	48 x 30	---	42 x 24
No Pedestrians, Bicycles, Motor-Driven Cycles	R5-10a	2B.39	30 x 36	30 x 36	---	---	---	---
No Pedestrians or Bicycles	R5-10b	2B.39	30 x 18	30 x 18	---	---	---	---
No Pedestrians	R5-10c	2B.39	24 x 12	24 x 12	---	---	---	---
Pedestrians, Bicycles, Motorized Bicycles, Non-Motorized Traffic Prohibited	R5-10d	2B.39	18 x 24	18 x 24	---	---	---	---
No Snowmobiles	R5-X1	2B.39.1	18 x 18	18 x 18	---	---	18 x 18	---
One Way	R6-1	2B.40	36 x 12	54 x 18	54 x 18	54 x 18	---	54 x 18
One Way	R6-2	2B.40	24 x 30	30 x 36	36 x 48	48 x 60	18 x 24*	36 x 48
Divided Highway Crossing	R6-3,3a	2B.42	30 x 24	30 x 24	36 x 30	---	---	36 x 30
Roundabout Directional (2 chevrons)	R6-4	2B.43	30 x 24	30 x 24	---	---	---	---
Roundabout Directional (3 chevrons)	R6-4a	2B.43	48 x 24	48 x 24	---	---	---	---
Roundabout Directional (4 chevrons)	R6-4b	2B.43	60 x 24	60 x 24	---	---	---	---
Roundabout Circulation (plaque)	R6-5P	2B.44	30 x 30	30 x 30	---	---	---	---

Table 2B-1. Regulatory Sign and Plaque Sizes (Sheet 2 of 5)

Sign or Plaque	Sign Designation	Section	Conventional Road		Expressway	Freeway	Minimum	Oversized
			Single Lane	Multi-Lane				
BEGIN ONE WAY	R6-6	2B.40	24 x 30	30 x 36	---	---	---	---
END ONE WAY	R6-7	2B.40	24 x 30	30 x 36	---	---	---	---
Parking Restrictions	R7-1, 2,2a,3,4,5,6, 7,8,21,22,23 23a,107,108	2B.46	12 x 18	12 x 18	---	---	---	---
Van Accessible (plaque)	R7-8bP	2B.48.1	12 x 6	12 x 6	---	---	---	---
Disabled Parking	R7-8m	2B.48.1	12 x 18	12 x 18	---	---	---	---
Fee Station	R7-20	2B.46	24 x 18	24 x 18	---	---	---	---
No Parking (with transit logo)	R7-107a	2B.46	12 x 30	12 x 30	---	---	---	---
No Parking/Retricted Parking (combined sign)	R7-200	2B.46	24 x 18	24 x 18	---	---	---	---
No Parking/Retricted Parking (combined sign)	R7-200a	2B.46	12 x 30	12 x 30	---	---	---	---
Tow Away Zone (plaque)	R7-201P,201aP	2B.46	12 x 6	12 x 6	---	---	---	---
This Side of Sign (plaque)	R7-202P	2B.46	12 x 6	12 x 6	---	---	---	---
Emergency Snow Route	R7-203	2B.46	18 x 24	18 x 24	---	---	---	24 x 30
No Parking on Pavement	R8-1	2B.46	24 x 30	24 x 30	36 x 48	48 x 60	---	36 x 48
No Parking Except on Shoulder	R8-2	2B.46	24 x 30	24 x 30	36 x 48	48 x 60	---	36 x 48
No Parking (symbol)	R8-3	2B.46	24 x 24	30 x 30	36 x 36	48 x 48	12 x 12	36 x 36
No Parking	R8-3a	2B.46	24 x 30	24 x 30	36 x 48	48 x 60	18 x 24	36 x 48
Except Sundays and Holidays (plaque)	R8-3bP	2B.46	24 x 18	24 x 18	---	---	12 x 9	30 x 24
On Pavement (plaque)	R8-3cP	2B.46	24 x 18	24 x 18	---	---	12 x 9	30 x 24
On Bridge (plaque)	R8-3dP	2B.46	24 x 18	24 x 18	---	---	12 x 9	30 x 24
On Tracks (plaque)	R8-3eP	2B.46	12 x 9	12 x 9	---	---	12 x 9	30 x 24
Except on Shoulder (plaque)	R8-3fP	2B.46	24 x 18	24 x 18	---	---	12 x 9	30 x 24
Loading Zone (plaque)	R8-3gP	2B.46	24 x 18	24 x 18	---	---	12 x 9	30 x 24
Times of Day (plaque)	R8-3hP	2B.46	24 x 18	24 x 18	---	---	12 x 9	30 x 24
Between Signs (plaque)	R8-3mP	2B.46	24 x 18	24 x 18	---	---	12 x 9	30 x 24
Emergency Parking Only	R8-4	2B.49	30 x 24	30 x 24	30 x 24	48 x 36	---	48 x 36
No Stopping on Pavement	R8-5	2B.46	24 x 30	24 x 30	36 x 48	48 x 60	---	36 x 48
No Stopping Except on Shoulder	R8-6	2B.46	24 x 30	24 x 30	36 x 48	48 x 60	---	36 x 48
Emergency Stopping Only	R8-7	2B.49	30 x 24	30 x 24	48 x 36	48 x 36	---	48 x 36
Do Not Stop on Tracks	R8-8	2B.49	24 x 30	24 x 30	36 x 48	---	---	48 x 60
Walk on Left Facing Traffic	R9-1	2B.50	18 x 24	18 x 24	---	---	---	---
Cross Only at Crosswalks	R9-2	2B.51	12 x 18	12 x 18	---	---	---	---
No Pedestrians	R9-3	2B.51	18 x 18	18 x 18	24 x 24	30 x 30	---	30 x 30
No Pedestrian Crossing	R9-3a	2B.51	12 x 18	12 x 18	---	---	---	---
Use Crosswalk (plaque)	R9-3bP	2B.51	18 x 12	18 x 12	---	---	---	---
No Hitchhiking (symbol)	R9-4	2B.50	18 x 18	18 x 18	---	---	---	24 x 24
No Hitchhiking	R9-4a	2B.50	18 x 24	18 x 24	---	---	12 x 18	---
Sidewalk Closed	R9-9	2B.58.2	30 x 18	30 x 18	---	---	24 x 12	---
Crosswalk Closed Use Other Side	R9-10	2B.58.2	48 x 24	48 x 24	---	---	24 x 12	---
No Skaters	R9-13	2B.39	18 x 18	18 x 18	24 x 24	30 x 30	---	30 x 30
No Equestrians	R9-14	2B.39	18 x 18	18 x 18	24 x 24	30 x 30	---	30 x 30
Cross Only on Green	R10-1	2B.52	12 x 18	12 x 18	---	---	---	---
Pedestrian Signs and Plaques	R10-2, 3,3b,3c,3d,4	2B.52	9 x 12	9 x 12	---	---	---	---

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Table 2B-1. Regulatory Sign and Plaque Sizes (Sheet 3 of 5)

Sign or Plaque	Sign Designation	Section	Conventional Road		Expressway	Freeway	Minimum	Oversized
			Single Lane	Multi-Lane				
Pedestrian Signs	R10-3a,3e,3f 3g,3h,3i,4a	2B.52	9 x 15	9 x 15	---	---	---	---
Left on Green Arrow Only	R10-5	2B.53	30 x 36	30 x 36	48 x 60	---	24 x 30	48 x 60
Stop Here on Red	R10-6	2B.53	24 x 36	24 x 36	---	---	---	36 x 48
Stop Here on Red	R10-6a	2B.53	24 x 30	24 x 30	---	---	---	36 x 42
Do Not Block Intersection	R10-7,7a	2B.53	24 x 30	24 x 30	---	---	---	---
Use Lane with Greed Arrow	R10-8	2B.53	36 x 42	36 x 42	36 x 42	---	---	60 x 72
Left (Right) Turn Signal	R10-10	2B.53	30 x 36	30 x 36	---	---	---	---
No Turn on Red	R10-11	2B.54	24 x 30	36 x 48	---	---	---	36 x 48
No Turn on Red	R10-11a	2B.54	30 x 36	36 x 48	---	---	---	---
No Turn on Red	R10-11b	2B.54	36 x 36	36 x 36	---	---	---	---
No Turn on Red Except from Right Lane	R10-11c	2B.54	30 x 42	30 x 42	---	---	---	---
No Turn on Red from This Lane	R10-11d	2B.54	30 x 42	30 x 42	---	---	---	---
Left Turn Yield on Green	R10-12	2B.53	30 x 36	30 x 36	---	---	---	---
Emergency Signal	R10-13	2B.53	42 x 30	42 x 30	---	---	---	---
Emergency Signal-Stop on Flashing Red	R10-14	2B.53	36 x 42	36 x 42	---	---	---	---
Emergency Signal-Stop on Flashing Red (overhead)	R10-14a	2B.53	60 x 24	60 x 24	---	---	---	---
Turning Vehicles Stop for Peds	R10-15a	2B.53	30 x 30	30 x 30	---	---	---	---
U-Turn Yield to Right Turn	R10-16	2B.53	30 x 36	30 x 36	---	---	---	---
Right on Red Arrow After Stop	R10-17a	2B.54	36 x 48	36 x 48	---	---	---	---
Traffic Laws Photo Enforced	R10-18	2B.55	36 x 24	36 x 24	48 x 30	54 x 36	---	54 x 36
Photo Enforced (symbol plaque)	R10-19P	2B.55	24 x 12	24 x 12	36 x 18	48 x 24	---	48 x 24
Photo Enforced (plaque)	R10-19aP	2B.55	24 x 18	24 x 18	36 x 30	48 x 36	---	48 x 36
Mon-Fri (and times) (3 lines) (plaque)	R10-20aP	2B.53	24 x 24	24 x 24	---	---	--	---
Sunday (and times)	R10-20aP	2B.53	24 x 18	24 x 18	30 x 24	---	---	48 x 36
Crosswalk, Stop on Red	R10-23	2B.53	24 x 30	24 x 30	---	---	---	---
Push Button to Turn on Warning Lights	R10-25	2B.52	9 x 12	9 x 12	---	---	---	---
Left Turn Yield on Flashing Red Arrow After Stop	R10-27	2B.53	30 x 36	30 x 36	---	---	---	---
XX Vehicles on Green	R10-28a	2B.56	24 x 30	24 x 30	---	---	---	---
XX Vehicles on Green Each Lane	R10-29a	2B.56	36 x 24	36 x 24	---	---	---	---
Right Turn on Red Must Yield to U-Turn At Signal (plaque)	R10-30	2B.54	30 x 36	30 x 36	---	---	---	---
Push Button for 2 Seconds for Extra Crossing Time	R10-32P	2B.52	9 x 12	9 x 12	---	---	---	---
Keep Off Median	R11-1	2B.57	24 x 30	24 x 30	---	---	---	---
Road Closed	R11-2,2a	2B.58	48 x 30	48 x 30	---	---	---	---
Road Closed - Local Traffic Only	R11-3a, 3b,3c,4	2B.58	60 x 30	60 x 30	---	---	---	---
Weight Limit	R12-1,2	2B.59	24 x 30	24 x 30	36 x 48	---	---	---
Weight Limit	R12-1a,3	2B.59	24 x 36	24 x 36	---	---	---	---
Weight Limit	R12-4	2B.59	36 x 24	36 x 24	---	---	---	---
Weight Limit	R12-5	2B.59	24 x 36	24 x 36	36 x 48	48 x 60	---	---
Restricted Bridge - XX Miles Ahead Weight Limit XX Tons	R12-X2	2B.59.1	60 x 36	60 x 36	---	---	---	---

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Table 2B-1. Regulatory Sign and Plaque Sizes (Sheet 4 of 5)

Sign or Plaque	Sign Designation	Section	Conventional Road		Expressway	Freeway	Minimum	Oversized
			Single Lane	Multi-Lane				
Trucks Must not Meet on Bridge	R12-X3	2B.59.1	36 x 24	36 x 24	---	---	---	---
Vehicles Must not Meet on Bridge	R12-X3a	2B.59.1	42 x 24	42 x 24	---	---	---	---
Restricted Bridge - XX Miles Ahead Weight Limit XX Tons, Clearance XX ft XX inches	R12-X4	2B.59.1	60 x 42	60 x 42	---	---	---	---
Restricted Bridge - XX Miles, Clearance XX ft XX inches	R12-X4a	2B.59.1	60 x 36	60 x 36	---	---	---	---
Weigh Station	R13-1	2B.60	72 x 54	72 x 54	96 x 72	120 x 90	---	---
Truck Route	R14-1	2B.61	24 x 18	24 x 18	---	---	---	---
Hazardous Material	R14-2,3	2B.62	24 x 24	24 x 24	30 x 30	36 x 36	---	---
National Network	R14-4,5	2B.63	30 x 30	30 x 30	36 x 36	36 x 36	---	---
Fender Bender Move Vehicles	R16-4	2B.65	36 x 24	36 x 24	48 x 36	60 x 48	---	48 x 36
Lights on When Using Wipers or Raining	R16-5,6	2B.64	24 x 30	24 x 30	36 x 48	48 x 60	---	36 x 48
Turn On Headlights Next XX Miles	R16-7	2B.64	48 x 15	48 x 15	72 x 24	96 x 30	---	72 x 24
Turn On, Check Headlights	R16-8,9	2B.64	30 x 15	30 x 15	48 x 24	60 x 30	---	48 x 24
Begin, End Daylight Headlight Section	R16-10,11	2B.64	48 x 15	48 x 15	72 x 24	96 x 30	---	72 x 24
State Law - Stop for School Bus when Red Lights Flashing	R16-X1	2B.66.2	72 x 48	72 x 48	72 x 48	---	---	---
State Law - Trucks and Vehicles with Trailers must Maintain 500 ft Interval	R16-X2	2B.66.2	78 x 48	78 x 48	78 x 48	78 x 48	---	---
Up to \$700 Fine for Littering Highways	R16-X3	2B.66.2	48 x 30	48 x 30	48 x 30	48 x 30	---	---
Emergency Stopping Only-Pedestrians, Bicycles, Motorized Bicycles, Non-Motorized Traffic Prohibited	R16-X4	2B.49	---	---	36 x 36	36 x 36	---	---
Signal Your Turn	R16-X6	2B.66.1	30 x 30	48 x 48	---	---	---	---
Rest Stop X Hr Limit - No Camping	R16-X8	2B.66.1	30 x 18	36 x 24	---	---	---	---
State Law - Unlawful to Pass on Shoulder	R16-X9	2B.66.2	60 x 48	60 x 48	---	---	---	---
No Fishing from Bridge	R16-X10	2B.66.1	18 x 24	18 x 24	---	---	---	---
State Law - Seat Belt Use Required	R16-X11	2B.66.2	72 x 36	72 x 36	72 x 36	72 x 36	---	---
Seat Belt (symbol) Fastened ?	R16-X12	2B.66.1	18 x 18	18 x 18	---	---	---	---
Vehicle Noise Laws Enforced	R16-X13	2B.66.1	24 x 24	24 x 24	---	---	---	---
Do Not Cross Double White Line	R16-X16	2B.33.1	30 x 48	30 x 48	48 x 66	48 x 66	---	---
Check Your Turn Signal	R16-X33	2B.66.1	24 x 30	24 x 30	---	---	---	---

* See Table 9B-1 for minimum size required for signs on bicycle facilities,

Table 2B-1. Regulatory Sign and Plaque Sizes (Sheet 5 of 5)

Where a regulatory sign, other than a STOP sign, is placed on the left-hand side of a multi-lane roadway in addition to the installation of the same regulatory sign on the right-hand side or the roadway, the size shown in the Single Lane column in Table 2B-1 may be used for both the sign on the right-hand side and the sign on the left-hand side of the roadway.

STANDARD:

A minimum size of 36 x 36 inches shall be used for STOP signs that face multi-lane approaches.

Where side roads intersect a multi-lane street or highway that has a speed limit of 45 mph or higher, the minimum size of the STOP signs facing the side road approaches, even if the side road only has one approach lane, shall be 36 x 36 inches.

Where side roads intersect a multi-lane street or highway that has a speed limit of 40 MPH or lower, the minimum size of the STOP signs facing the side road approaches shall be as shown in the Single Lane or Multi-lane columns of Table 2B-1 based on the number of approach lanes on the side street approach.

GUIDANCE:

The minimum sizes for regulatory signs facing traffic on exit and entrance ramps should be as shown in the column of Table 2B-1 that corresponds to the mainline roadway classification (Expressway or Freeway). If a minimum size is not provided in the Freeway column, the minimum size in the Expressway column should be used. If a minimum size is not provided in the Freeway or Expressway Column, the size in the Oversized column should be used.

2B.4 Right-of-Way at Intersections

SUPPORT:

State or local laws written in accordance with the "Uniform Vehicle Code" (see Section 1A.11) establish the right-of-way rule at intersections with four approaches having no regulatory traffic control signs such that the driver of a vehicle approaching an intersection must yield the right-of-way to any vehicle or pedestrian already in the intersection. When two vehicles approach an intersection with four approaches from different streets or highways at approximately the same time, the right-of-way rule requires the driver of the vehicle on the left to yield the right-of-way to the vehicle on the right. The right-of-way can be modified at through streets or highways by placing YIELD (R1-2) signs (see Sections 2B.8 and 2B.9) or STOP (R1-1) signs (see Sections 2B.5 through 2B.7) on one or more approaches.

GUIDANCE:

Engineering judgment should be used to establish intersection control. The following factors should be considered:

- A. Vehicular, bicycle, and pedestrian traffic volumes on all approaches;
- B. Number and angle of approaches;
- C. Approach speeds;
- D. Sight distance available on each approach; and
- E. Reported crash experience.

YIELD or STOP signs should be used at an intersection if one or more of the following conditions exist:

- A. An intersection of a less important road with a main road where application of the normal right-of-way rule would not be expected to provide reasonable compliance with the law;
- B. A street entering a designated through highway or street; and/or
- C. An unsignalized intersection in a signalized area.

In addition, the use of YIELD or STOP signs should be considered at the intersection of two minor streets or local roads where the intersection has more than three approaches and where one or more of the following conditions exist:

- A. The combined vehicular, bicycle, and pedestrian volume entering the intersection from all approaches averages more than 2,000 units per day;
- B. The ability to see conflicting traffic on an approach is not sufficient to allow a road user to stop or yield in compliance with the normal right-of-way rule if such stopping or yielding is necessary; and/or
- C. Crash records indicate that five or more crashes that involve the failure to yield the right-of-way at the intersection under the normal right-of-way rule have been reported within a 3-year period, or that three or more such crashes have been reported within a 2-year period.

YIELD or STOP signs should not be used for speed control.

SUPPORT:

Section 2B.7 contains provisions regarding the application of multi-way STOP control at an intersection.

GUIDANCE:

Once the decision has been made to control an intersection, the decision regarding the appropriate roadway to control should be based on engineering judgment. In most cases, the roadway carrying the lowest volume of traffic should be controlled.

A YIELD or STOP sign should not be installed on the higher volume roadway unless justified by an engineering study.

SUPPORT:

The following are considerations that might influence the decision regarding the appropriate roadway upon which to install a YIELD or STOP sign where two roadways with relatively equal volumes and/or characteristics intersect:

- A. Controlling the direction that conflicts the most with established pedestrian crossing activity or school walking routes;
- B. Controlling the direction that has obscured vision, dips, or bumps that already require drivers to use lower operating speeds; and
- C. Controlling the direction that has the best sight distance from a controlled position to observe conflicting traffic.

STANDARD:

Because the potential for conflicting commands could create driver confusion, YIELD or STOP signs shall not be used in conjunction with any traffic control signal operation, except in the following cases:

- A. A STOP sign, if the signal indication for an approach is a flashing red at all times;
- B. If a minor street or driveway is located within or adjacent to the area controlled by the traffic control signal, but does not require separate traffic signal control because an extremely low potential for conflict exists; or
- C. If a channelized turn lane is separated from the adjacent travel lanes by an island and the channelized turn lane is not controlled by a traffic control signal.

Except as provided in Section 2B.9, STOP signs and YIELD signs shall not be installed on different approaches to the same unsignalized intersection if those approaches conflict with or oppose each other.

Portable or part-time STOP or YIELD signs shall not be used except for emergency and temporary traffic control zone purposes.

A portable or part-time (folding) STOP sign that is manually placed into view and manually removed from view shall not be used during a power outage to control a signalized approach unless the maintaining agency establishes that the signal indication that will first be displayed to that approach upon restoration of power is a flashing red signal indication and that the portable STOP sign will be manually removed from view prior to stop-and-go operation of the traffic control signal.

OPTION:

A portable or part-time (folding) STOP sign that is electrically or mechanically operated such that it only displays the STOP message during a power outage and ceases to

display the STOP message upon restoration of power may be used during a power outage to control a signalized approach.

SUPPORT:

Section 9B.3 contains provisions regarding the assignment of priority at a shared-use path/roadway intersection.

2B.5 STOP Sign (R1-1) and ALL WAY Plaque (R1-3P)



R1-1



R1-3P

STANDARD:

When it is determined that a full stop is always required on an approach to an intersection, a STOP (R1-1) sign shall be used.

The STOP sign shall be an octagon with a white legend and border on a red background.

At intersections where all approaches are controlled by STOP signs (see Section 2B.7), an ALL WAY supplemental plaque (R1-3P) shall be mounted below each STOP sign. The ALL WAY plaque shall have a white legend and border on a red background.

The ALL WAY plaque shall only be used if all intersection approaches are controlled by STOP signs.

Supplemental plaques with legends such as 2-WAY, 3-WAY, 4-WAY, or other numbers of ways shall not be used with STOP signs.

SUPPORT:

The use of the CROSS TRAFFIC DOES NOT STOP (W4-4P) plaque (and other plaques with variations of this word message) is described in Section 2C.59.

GUIDANCE:

Plaques with the appropriate alternative messages of TRAFFIC FROM LEFT (RIGHT) DOES NOT STOP (W4-4aP) or ONCOMING TRAFFIC DOES NOT STOP (W4-4bP) should be used at intersections where STOP signs control all but one approach to the intersection, unless the only non-stopped approach is from a one-way street.

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GUIDANCE:

STOP or YIELD signs should not be placed farther than 50 feet from the edge of the pavement of the intersected roadway (see Drawing F in Figure 2A-3).

A sign that is mounted back-to-back with a STOP or YIELD sign should stay within the edges of the STOP or YIELD sign. If necessary, the size of the STOP or YIELD sign should be increased so that any other sign installed back-to-back with a STOP or YIELD sign remains within the edges of the STOP or YIELD sign.



R1-2aP

OPTION:

Where drivers proceeding straight ahead must yield to traffic approaching from the opposite direction, such as at a one-lane bridge, a TO ONCOMING TRAFFIC (R1-2aP) plaque may be mounted below the YIELD sign.

SUPPORT:

Figure 2A-3 shows examples of some typical placements of STOP signs and YIELD signs.

Section 2A.16 contains additional information about separate and combined mounting of other signs with STOP or YIELD signs.

GUIDANCE:

Stop lines that are used to supplement a STOP sign should be located as described in Section 3B.16. Yield lines that are used to supplement a YIELD sign should be located as described in Section 3B.16.

Where there is a marked crosswalk at the intersection, the STOP sign should be installed in advance of the crosswalk line nearest to the approaching traffic.

Except at roundabouts, where there is a marked crosswalk at the intersection, the YIELD sign should be installed in advance of the crosswalk line nearest to the approaching traffic.

Where two roads intersect at an acute angle, the STOP or YIELD sign should be positioned at an angle, or shielded, so that the legend is out of view of traffic to which it does not apply.

If a raised splitter island is available on the left-hand side of a multi-lane roundabout approach, an additional YIELD sign should be placed on the left-hand side of the approach.

OPTION:

If a raised splitter island is available on the left-hand side of a single lane roundabout approach, an additional YIELD sign may be placed on the left-hand side of the approach.

At wide-throat intersections or where two or more approach lanes of traffic exist on the signed approach, observance of the right-of-way control may be improved by the installation of an additional STOP or YIELD sign on the left-hand side of the road and/or the use of a stop or yield line. At channelized intersections or at divided roadways separated by a median, the additional STOP or YIELD sign may be placed on a channelizing island or in the median. An additional STOP or YIELD sign may also be placed overhead facing the approach at the intersection to improve observance of the right-of-way control.

STANDARD:

More than one STOP sign or more than one YIELD sign shall not be placed on the same support facing in the same direction.

OPTION:

For a yield-controlled channelized right-turn movement onto a roadway without an acceleration lane and for an entrance ramp onto a freeway or expressway without an acceleration lane, a NO MERGE AREA (W4-5P) supplemental plaque (see Section 2C.40) may be mounted below a Yield Ahead (W3-2) sign and/or below a YIELD (R1-2) sign when engineering judgment indicates that road users would expect an acceleration lane to be present.

2B.11 Stop Here For Pedestrians Signs (R1-5 Series)



R1-5b



R1-5c

STANDARD:

Stop Here For Pedestrians (R1-5b or R1-5c) signs shall be used if stop lines are used in advance of a marked crosswalk that crosses an uncontrolled multi-lane approach. The Stop Here for Pedestrians signs shall only be used where the law specifically requires that a driver must stop for a pedestrian in a crosswalk. The legend STATE LAW may be displayed at the top of the R1-5b and R1-5c signs, if applicable.

GUIDANCE:

If stop lines and Stop Here For Pedestrians signs are used in advance of a crosswalk that crosses an uncontrolled multi-lane approach, they should be placed 20 to 50 feet in advance of the nearest crosswalk line (see Section 3B.16 and Figure 3B-17), and parking should be prohibited in the area between the stop line and the crosswalk.

Stop lines and Stop Here For Pedestrians signs should not be used in advance of crosswalks that cross an approach to or departure from a roundabout.

OPTION:

Stop Here For Pedestrians signs may be used in advance of a crosswalk that crosses an uncontrolled multi-lane approach to indicate to road users where to stop even if stop lines are not used.

A Pedestrian Crossing (W11-2) warning sign may be placed overhead or may be post-mounted with a diagonal downward pointing arrow (W16-7P) plaque at the crosswalk location where Stop Here For Pedestrians signs have been installed in advance of the crosswalk.

STANDARD:

If a W11-2 sign has been post-mounted at the crosswalk location where a Stop Here For Pedestrians sign is used on the approach, the Stop Here For Pedestrians sign shall not be placed on the same post as or block the road user's view of the W11-2 sign.

OPTION:

An advance Pedestrian Crossing (W11-2) warning sign with an AHEAD or a distance supplemental plaque may be used in conjunction with a Stop Here For Pedestrians sign on the approach to the same crosswalk.

In-Street Pedestrian Crossing signs and Stop Here For Pedestrians signs may be used together at the same crosswalk.

2B.12 In-Street and Overhead Pedestrian Crossing Signs (R1-6a, R1-6b, R1-9a, and R1-9b)



OPTION:

The In-Street Pedestrian Crossing (R1-6a or R1-6b) sign or the Overhead Pedestrian Crossing (R1-9b) sign may be used to remind road users of laws regarding right-of-way at an unsignalized pedestrian crosswalk. The legend STATE LAW may be displayed at the top of the R1-6a, R1-6b, and R1-9b signs, if applicable.

Highway agencies may develop and apply criteria for determining the applicability of In-Street Pedestrian Crossing signs.

GUIDANCE:

In order to avoid overuse, the In-Street Pedestrian Crossing sign should only be used at locations having high pedestrian crossings.

STANDARD:

If used, the In-Street Pedestrian Crossing sign shall be placed in the roadway at the crosswalk location on the center line, on a lane line, or on a median island. The In-Street Pedestrian Crossing sign shall not be post-mounted on the left-hand or right-hand side of the roadway.

If used, the Overhead Pedestrian Crossing sign shall be placed over the roadway at the crosswalk location.

An In-Street or Overhead Pedestrian Crossing sign shall not be placed in advance of the crosswalk to educate road

SUPPORT:

Minnesota Statute 169.14 sets forth speed limits to govern all roadways and alleys in the state. Any posted speed limit greater or less than the statutory speed limits must be authorized by the Commissioner of Transportation. Any alteration of statutory speed limits on any public road or street shall be based upon the results of an engineering and traffic investigation.

Minnesota Statute, section 169.14, subd. 5, states that:

When local authorities believe that the existing speed limit upon any street or highway, or part thereof, within their respective jurisdictions and not a part of the trunk highway system is greater or less than is reasonable or safe under existing condition, they may request the commissioner (of transportation) to authorize, upon the basis of an engineering and traffic investigation, the erection of appropriate signs designating a reasonable and safe speed limit thereat, which speed limit shall be effective when such signs are erected.

GUIDANCE:

A Reduced Speed Limit Ahead (W3-5 or W3-5a) sign (see Section 2C.38) should be used to inform road users of a reduced speed zone where the speed limit is being reduced by more than 10 mph, or where engineering judgment indicates the need for advance notice to comply with the posted speed limit ahead.

States and local agencies should conduct engineering studies to reevaluate non-statutory speed limits on segments of their roadways that have undergone significant changes since the last review, such as the addition or elimination of parking or driveways, changes in the number of travel lanes, or changes in the configuration of bicycle lanes.

No more than three speed limits should be displayed on any one Speed Limit sign or assembly.

When a speed limit within a speed zone is posted, it should be within 5 mph of the 85th-percentile speed of free-flowing traffic.

Speed studies for signalized intersection approaches should be taken outside the influence area of the traffic control signal, which is generally considered to be approximately 1/2 mile, to avoid obtaining skewed results for the 85th-percentile speed.

STANDARD:

A Speed Limit sign shall not be used to warn road users of an advisory speed for certain roadway conditions. See Section 2C.8 for use of advisory speed plaques.

OPTION:

Other factors that may be considered when establishing speed limits are the following:

- A. Road characteristics, shoulder condition, grade, alignment, and sight distance;
- B. The pace speed;
- C. Roadside development and environment;
- D. Parking practices and pedestrian activity; and
- E. Reported crash experience for at least a 12-month period.

Two types of Speed Limit signs may be used: one to designate passenger car speeds, including any nighttime information or minimum speed limit that might apply; and the other to show any special speed limits for trucks and other vehicles.

A changeable message sign that changes the speed limit for traffic and ambient conditions may be installed provided that the appropriate speed limit is displayed at the proper times.

A changeable message sign that displays to approaching drivers the speed at which they are traveling may be installed in conjunction with a Speed Limit sign.

GUIDANCE:

If a changeable message sign displaying approach speeds is installed, the legend YOUR SPEED XX MPH or such similar legend should be displayed. The color of the changeable message legend should be a yellow legend on a black background or the reverse of these colors.

Reduced Speed Ahead Signs (R2-5 series)

STANDARD:

The Reduced Speed Ahead signs shall be removed and replaced with Speed Reduction signs (W3-5, W3-5a), see Section 2C.38.



R2-5a



R2-5b



R2-5c



R2-X1

SUPPORT:

Advisory Speed signs and plaques are discussed in Sections 2C.8 and 2C.14. Temporary Traffic Control Zone Speed signs are discussed in Part 6. The WORK ZONE (G20-5aP) plaque intended for installation above a Speed Limit sign is discussed in Section 6F.12. School Speed Limit signs are discussed in Section 7B.15.

2B.13.1 Bridge Speed Limit (R2-X5)



R2-X5

STANDARD:

The BRIDGE SPEED LIMIT sign shall be used and installed as stated in Minnesota Statute (section 169.16):

1. When it has been determined by the Commissioner of Transportation that it is necessary to limit the speed of vehicles on a bridge or other elevated structure constituting part of a highway to the maximum speed which can be maintained with safety on such bridge or structure,
2. Suitable signs stating such maximum speed shall be erected and maintained at a distance of 100 feet before each end of the structure.

A Bridge Speed Limit shall become effective when the Bridge Speed Limit signs are installed.

GUIDANCE:

A Speed Reduction (W3-5a) sign should be used in advance of the BRIDGE SPEED LIMIT sign.

SUPPORT:

On roads maintained by Mn/DOT, the Mn/DOT Office of Bridges and Structures determines when a reduced speed limit is required on a bridge or other elevated structure constituting part of a highway. They inform the appropriate Mn/DOT district traffic engineer of their findings. It is the responsibility of the district traffic engineer to prepare a Speed Limit Authorization Form and submit it to the Office of Traffic, Safety and Technology (OTST).

OPTION:

Local road authorities may submit a request stating their engineering findings to the local Mn/DOT district traffic engineer. A report is then prepared and submitted along with recommendations to OTST.

2B.14 Truck Speed Limit Sign (R2-2P)



R2-2P

STANDARD:

Where a special speed limit applies to trucks or other vehicles, the legend TRUCKS XX or such similar legend shall be displayed below the legend Speed Limit XX on the same sign or on a separate R2-2P plaque below the Speed Limit sign.

2B.15 Night Speed Limit Sign (R2-3P)



R2-3P

STANDARD:

Where different speed limits are authorized for day and night, both limits shall be posted.

GUIDANCE:

A Night Speed Limit (R2-3P) plaque (see Figure 2B-3) should be reversed using a white retroreflectorized legend and border on a black background.

OPTION:

A Night Speed Limit sign may be combined with or installed below the standard Speed Limit (R2-1) sign.

2B.37 DO NOT ENTER Sign (R5-1)



R5-1

STANDARD:

The DO NOT ENTER (R5-1) sign shall be used where traffic is prohibited from entering a restricted roadway.

GUIDANCE:

The DO NOT ENTER sign, if used, should be placed directly in view of a road user at the point where a road user could wrongly enter a divided highway, one-way roadway, or ramp (see Figure 2B-12). The sign should be mounted on the right-hand side of the roadway, facing traffic that might enter the roadway or ramp in the wrong direction.

If the DO NOT ENTER sign would be visible to traffic to which it does not apply, the sign should be turned away from, or shielded from, the view of that traffic.

OPTION:

The DO NOT ENTER sign may be installed where it is necessary to emphasize the one-way traffic movement on a ramp or turning lane.

A second DO NOT ENTER sign on the left-hand side of the roadway may be used, particularly where traffic approaches from an intersecting roadway (see Figure 2B-12).

SUPPORT:

Section 2B.41 contains information regarding an optional lower mounting height for DO NOT ENTER signs that are located along an exit ramp facing a road user who is traveling in the wrong direction.

2B.38 WRONG WAY Sign (R5-1a)



R5-1a

OPTION:

The WRONG WAY (R5-1a) sign may be used as a supplement to the DO NOT ENTER sign where an exit ramp intersects a crossroad or a crossroad intersects a one-way roadway in a manner that does not physically discourage or prevent wrong-way entry (see Figure 2B-12).

GUIDANCE:

If used, the WRONG WAY sign should be placed at a location along the exit ramp or the one-way roadway farther from the crossroad than the DO NOT ENTER sign (see Section 2B.41).

SUPPORT:

Section 2B.41 contains information regarding an optional lower mounting height for WRONG WAY signs that are located along an exit ramp facing a road user who is traveling in the wrong direction.

2B.39 Selective Exclusion Signs



R5-2



R5-3



R5-4



R5-5



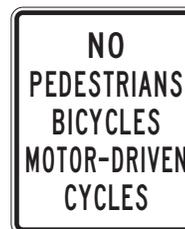
R5-6



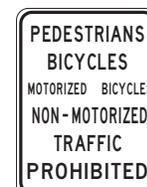
R5-7



R5-8



R5-10a



R5-10d



R5-10b



R5-10c

OPTION:

Appropriate combinations or groupings of these legends into a single sign, such as NO PEDESTRIANS BICYCLES MOTOR-DRIVEN CYCLES (R5-10a), or NO PEDESTRIANS OR BICYCLES (R5-10b) may be used.

STANDARD:

Minnesota has adopted the PEDESTRIANS BICYCLES MOTORIZED BICYCLES NON-MOTORIZED TRAFFIC PROHIBITED (R5-10d) sign which shall be used on all exit ramps from freeways and controlled access expressways. It shall be installed between the DO NOT ENTER (R5-1) sign and the WRONG WAY (R5-1a) sign.

GUIDANCE:

If an exclusion is governed by vehicle weight, a Weight Limit sign (see Section 2B.59) should be used instead of a Selective Exclusion sign.

If used on a freeway or expressway ramp, the NO PEDESTRIANS OR BICYCLES (R5-10b) sign should be installed in a location where it is clearly visible to any pedestrian or bicyclist attempting to enter the limited access facility from a street intersecting the exit ramp.

The Selective Exclusion sign should be placed on the right-hand side of the roadway at an appropriate distance from the intersection so as to be clearly visible to all road users turning into the roadway that has the exclusion. The NO PEDESTRIANS (R5-10c) or No Pedestrian Crossing (R9-3) sign (see Section 2B.51) should be installed so as to be clearly visible to pedestrians who are at a location where an alternative route is available.

OPTION:

The NO PEDESTRIANS (R5-10c) or No Pedestrian Crossing (R9-3) sign may also be used at underpasses or elsewhere where pedestrian facilities are not provided.

The NO TRUCKS (R5-2a) word message sign may be used as an alternate to the No Trucks (R5-2) symbol sign.

The AUTHORIZED VEHICLES ONLY (R5-11) sign may be used at median openings and other locations to prohibit vehicles from using the median opening or facility unless they have special permission (such as law enforcement vehicles or emergency vehicles) or are performing official business (such as highway agency vehicles).

2B.39.1 Other Selective Exclusion Signs (R5-X1)



R5-X1

GUIDANCE:

The No Snowmobile (R5-X1) symbol sign should be used to restrict access to highways and certain geographic areas.

GUIDANCE:

They should be erected at suitable locations as required to convey the appropriate message.

2B.40 ONE WAY Signs (R6-1, R6-2)



R6-1



R6-2

STANDARD:

Except as provided in the following Option, the ONE WAY (R6-1 or R6-2) sign shall be used to indicate streets or roadways upon which vehicular traffic is allowed to travel in one direction only.

ONE WAY signs shall be placed parallel to the one-way street at all alleys and roadways that intersect one-way roadways as shown in Figure 2B-14.

At an intersection with a divided highway that has a median width at the intersection itself of 30 feet or more, ONE WAY signs shall be placed, visible to each crossroad approach, on the near right and far left corners of each intersection with the directional roadways (see Figure 2B-15).

At an intersection with a divided highway that has a median width at the intersection itself of less than 30 feet, Keep Right (R4-7) signs and/or ONE WAY signs shall be installed (see Figures 2B-16 and 2B-17). If Keep Right signs are installed, they shall be placed as close as practical to the approach ends of the medians and shall be visible to traffic on the divided highway and each crossroad approach. If ONE WAY signs are installed, they shall be placed on the near right and far left corners of the intersection and shall be visible to each crossroad approach.

Compliance Date: December 31, 2019

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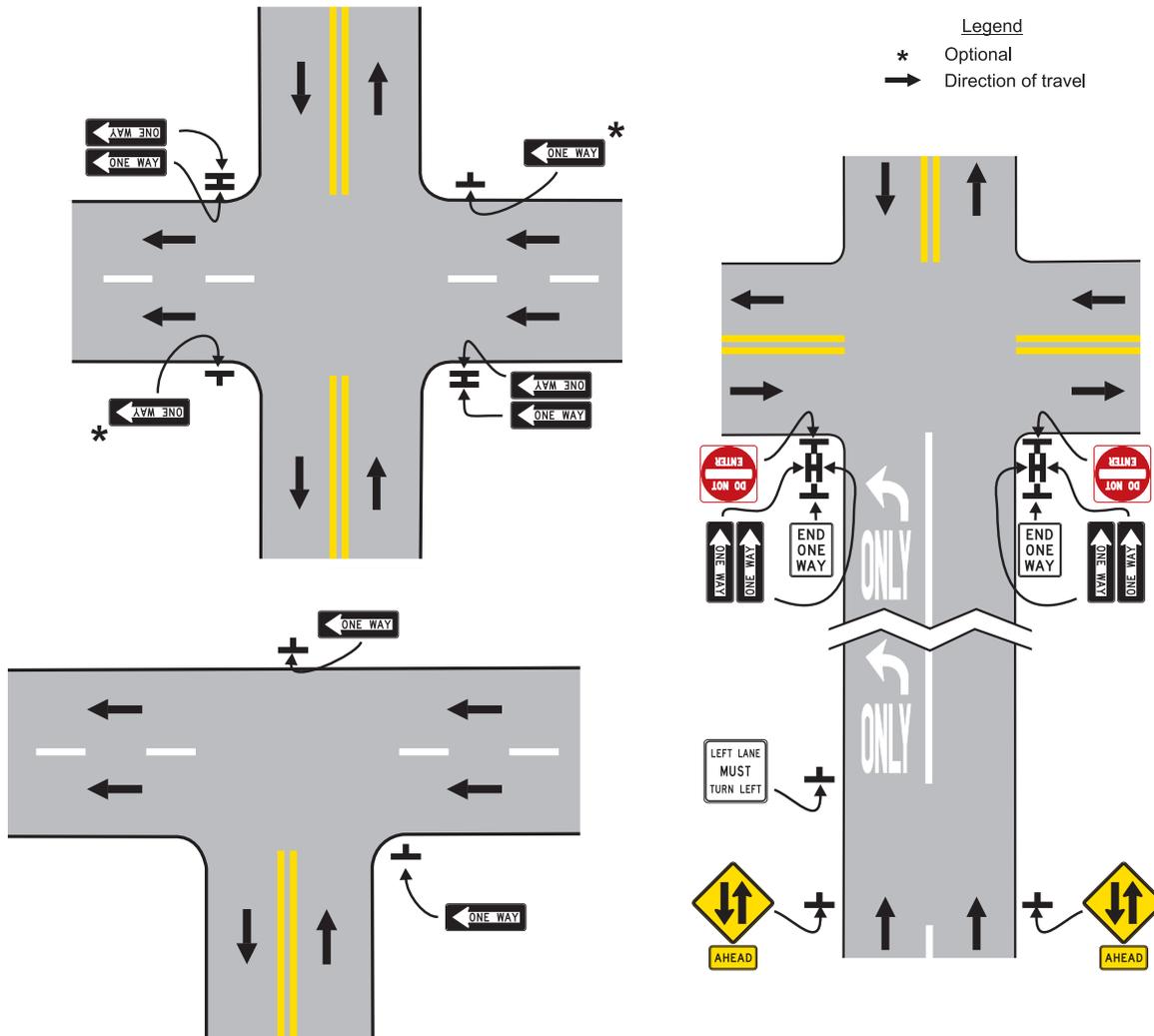


Figure 2B-14. Locations of ONE WAY Signs

OPTION:

At an intersection with a divided highway that has a median width at the intersection itself of less than 30 feet, ONE WAY signs may also be placed on the far right corner of the intersection as shown in Figures 2B-16 and 2B-17.

ONE WAY signs may be omitted on the one-way roadways of divided highways, where the design of interchanges indicates the direction of traffic on the separate roadways.

ONE WAY signs may be omitted from the medians at intersections with divided highways that have median widths of greater than 30 feet when an engineering study has demonstrated that the signs may confuse motorists.

STANDARD:

If used at unsignalized intersections with one-way streets, ONE WAY signs shall be placed on the near right and the far left corners of the intersection facing traffic entering or crossing the one-way street (see Figure 2B-14).

If used at signalized intersections with one-way streets, ONE WAY signs shall be placed near the appropriate signal faces, on the poles holding the traffic signals, on the mast arm or span wire holding the signals, or at the locations specified for unsignalized intersections.

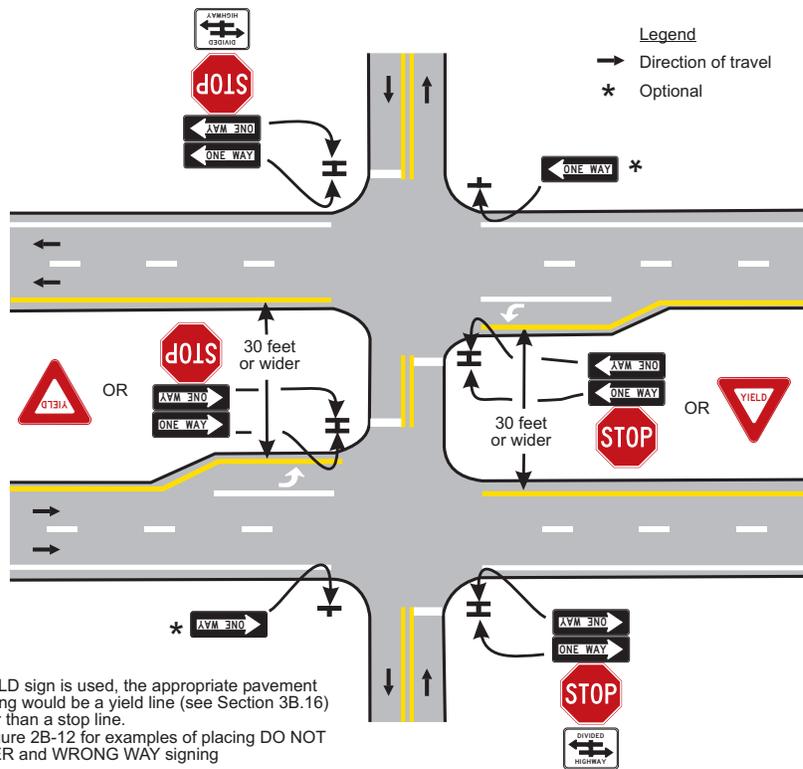


Figure 2B-15. ONE WAY Signing for Divided Highways with Median Widths of 30 Feet or Wider

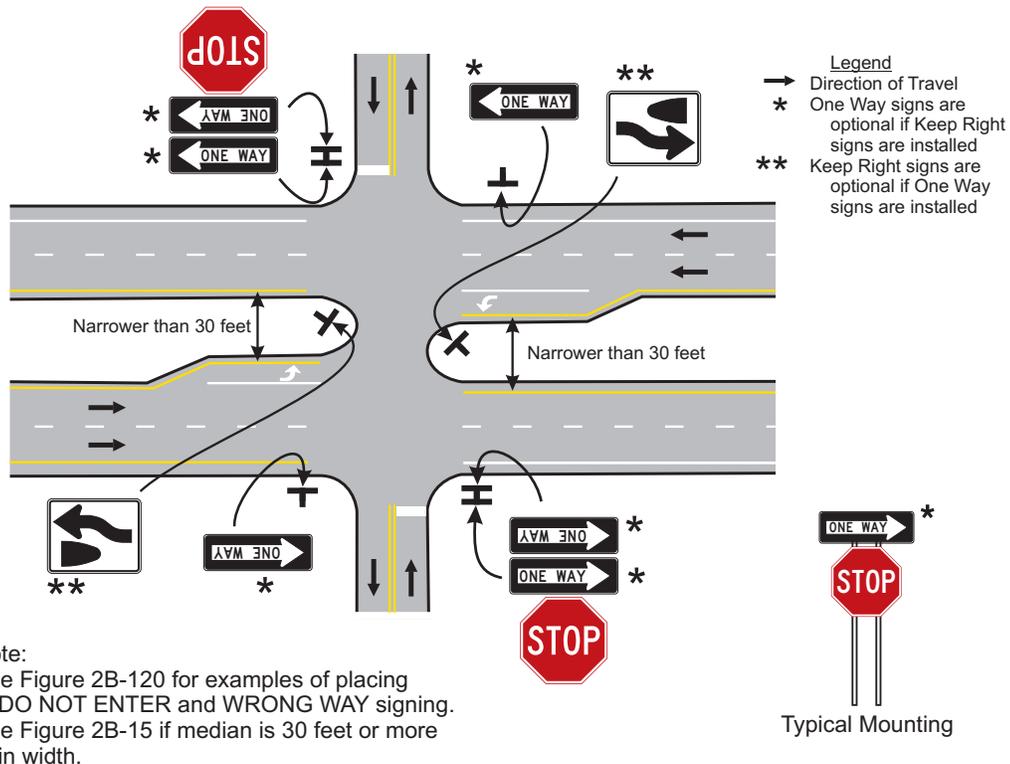


Figure 2B-16. ONE WAY Signing for Divided Highways with Median Widths Narrower Than 30 Feet

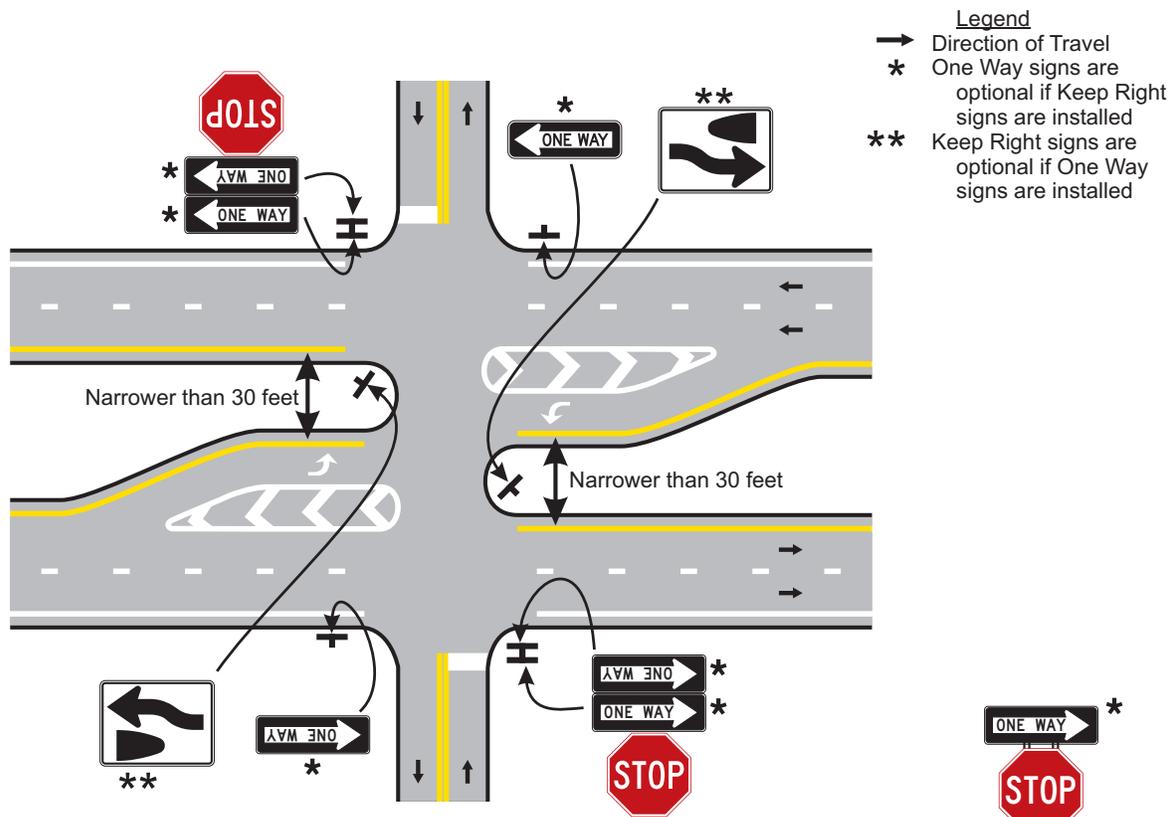


Figure 2B-17. ONE WAY Signing for Divided Highways with Median Widths Narrower Than 30 Feet and Separated Left-Turn Lanes

At unsignalized T-intersections where the roadway at the top of the T-intersection is a one-way roadway, ONE WAY signs shall be placed on the near right and the far side of the intersection facing traffic on the stem approach (see Figure 2B-14).

At signalized T-intersections where the roadway at the top of the T-intersection is a one-way roadway, ONE WAY signs shall be placed near the appropriate signal faces, on the poles holding the traffic signals, on the mast arm or span wire holding the signals, or at the locations specified for unsignalized intersections.

Compliance Date: December 31, 2019

OPTION:

Where the central island of a roundabout allows for the installation of signs, ONE WAY signs may be used instead

of or in addition to Roundabout Directional Arrow (R6-4 series) signs (see Section 2B.43) to direct traffic counter-clockwise around the central island.

GUIDANCE:

Where used on the central island of a roundabout, the mounting height of a ONE WAY sign should be at least 4 feet, measured vertically from the bottom of the sign to the elevation of the near edge of the traveled way.

SUPPORT:

Using ONE WAY signs on the central island of a roundabout might result in some drivers incorrectly concluding that the cross street is a one-way street. Using Roundabout Directional Arrow signs might reduce this confusion. However, using ONE WAY signs might be necessary in States that have defined a roundabout as a series of T-intersections.

SUPPORT:

Section 2B.42 contains further information on signing to avoid wrong-way movements at at-grade intersections on expressways.

2B.42 Divided Highway Crossing Signs (R6-3, R6-3a)



R6-3



R6-3a

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STANDARD:

On unsignalized minor-street approaches from which both left turns and right turns are permitted onto a divided highway that has a median width at the intersection itself of 30 feet or more, except as provided in the following Option, a Divided Highway Crossing (R6-3 or R6-3a) sign shall be used to advise road users that they are approaching an intersection with a divided highway (see Figure 2B-15).

OPTION:

If the divided highway that has a median width at the intersection itself of 30 feet or more has a traffic volume of less than 400 AADT and a speed limit of 25 mph or less, the Divided Highway Crossing signs facing the unsignalized minor-street approaches may be omitted.

A Divided Highway Crossing sign may be used on signalized minor-street approaches from which both left turns and right turns are permitted onto a divided highway to advise road users that they are approaching an intersection with a divided highway.

If a Divided Highway Crossing sign is used at a four-legged intersection, the R6-3 sign shall be used. If used at a T-intersection, the R6-3a sign shall be used.

The Divided Highway Crossing sign shall be located on the near right corner of the intersection, mounted beneath a STOP or YIELD sign or on a separate support.

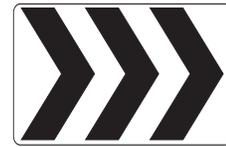
OPTION:

An additional Divided Highway Crossing sign may be installed on the left-hand side of the approach to supplement the Divided Highway Crossing sign on the near right corner of the intersection.

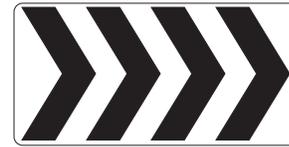
2B.43 Roundabout Directional Arrow Signs (R6-4, R6-4a, and R6-4b)



R6-4



R6-4a



R6-4b

GUIDANCE:

Where the central island of a roundabout allows for the installation of signs, Roundabout Directional Arrow (R6-4 series) signs should be used in the central island to direct traffic counter-clockwise around the central island, except as provided in the second Option in Section 2B.40.

STANDARD:

The R6-4 sign shall be a horizontal rectangle with two black chevron symbols pointing to the right on a white background. The R6-4a sign shall be a horizontal rectangle with three black chevron symbols pointing to the right on a white background. The R6-4b sign shall be a horizontal rectangle with four black chevron symbols pointing to the right on a white background. No border shall be used on the Roundabout Directional Arrow signs.

Roundabout Directional Arrow signs shall be used only at roundabouts and other circular intersections.

GUIDANCE:

When used on the central island of a roundabout, the mounting height of a Roundabout Directional Arrow sign should be at least 4 feet, measured vertically from the bottom of the sign to the elevation of the near edge of the traveled way.

OPTION:

More than one Roundabout Directional Arrow sign and/or R6-4a or R6-4b signs may be used facing high-speed approaches, facing approaches with limited visibility, or in other circumstances as determined by engineering judgment where increased sign visibility would be appropriate.

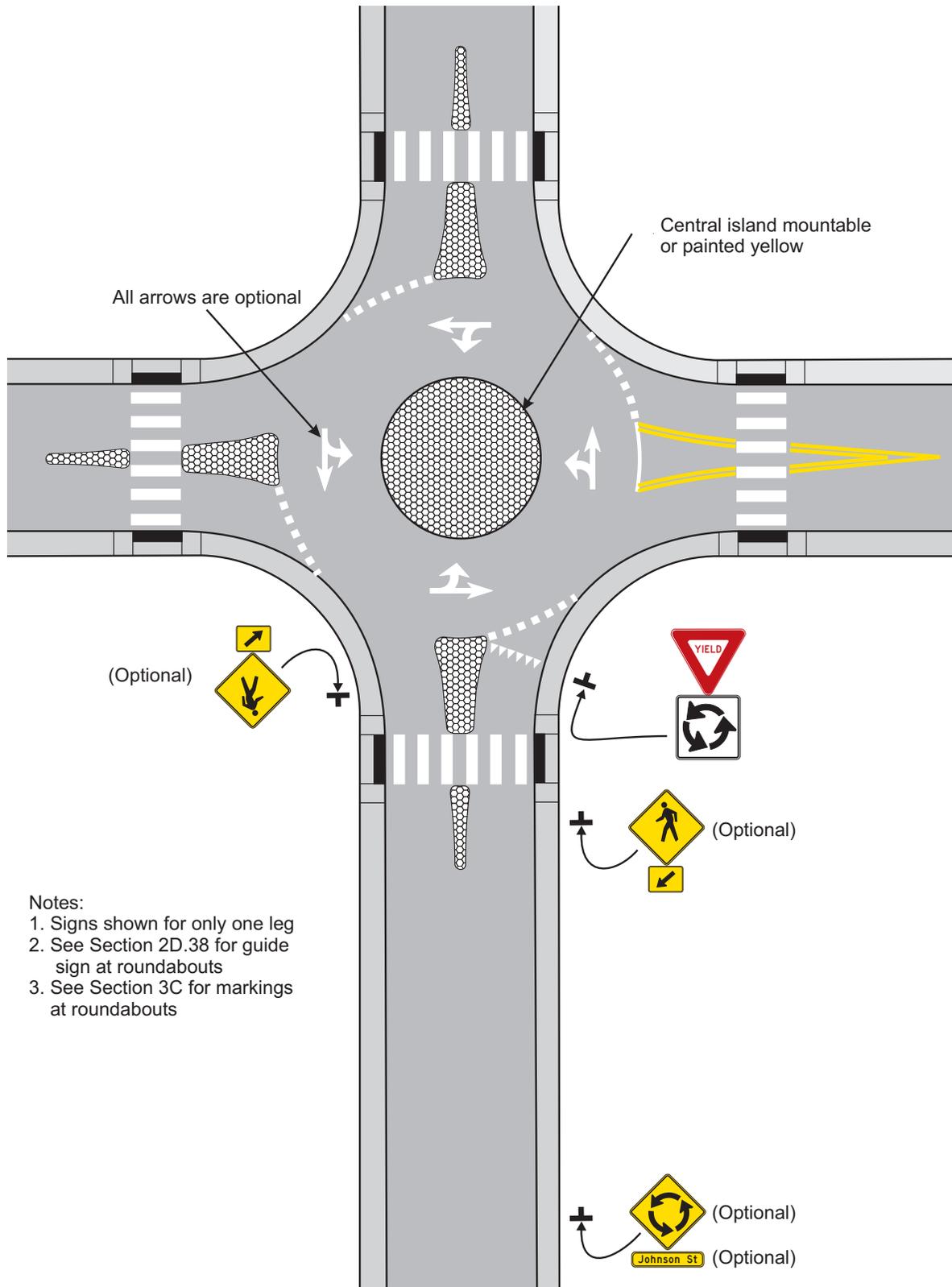


Figure 2B-21. Example of Regulatory and Warning Signs for a Mini-Roundabout

2B.44 Roundabout Circulation Plaque (R6-5P)



R6-5P

GUIDANCE:

Where the central island of a roundabout does not provide a reasonable place to install a sign, Roundabout Circulation (R6-5P) plaques should be placed below the YIELD signs on each approach.

OPTION:

At roundabouts where Roundabout Directional Arrow signs and/or ONE WAY signs have been installed in the central island, Roundabout Circulation plaques may be placed below the YIELD signs on approaches to roundabouts to supplement the central island signs.

The Roundabout Circulation plaque may be used at any type of circular intersection.

2B.45 Examples of Roundabout Signing

SUPPORT:

Figures 2B-21 through 2B-23 illustrate examples of regulatory and warning signing for roundabouts of various configurations.

Section 2D.38 contains information regarding guide signing at roundabouts and Chapter 3C contains information regarding pavement markings at roundabouts.

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

SUPPORT:

Signs governing the parking, stopping, and standing of vehicles cover a wide variety of regulations, and only general guidance can be provided here. The word “standing” when used on the R7 and R8 series of signs refers to the practice of a driver keeping the vehicle in a stationary position while continuing to occupy the vehicle. Typical examples of parking, stopping, and standing signs and plaques are as follows:

1. NO PARKING ANY TIME (R7-1);
2. NO PARKING X:XX AM TO X:XX PM (R7-2);
3. NO PARKING EXCEPT SUNDAYS AND HOLIDAYS (R7-3);
4. NO STANDING ANY TIME (R7-4);
5. XX HOUR PARKING X:XX AM-X:XX PM (R7-5);
6. NO PARKING LOADING ZONE (R7-6);
7. NO PARKING BUS STOP (R7-7, R7-107, R7-107a);
8. RESERVED PARKING for persons with disabilities (R7-8m);
9. VAN ACCESSIBLE (R7-8b);
10. Pay Station (R7-20);
11. Pay Parking (R7-21, R7-21a, R7-22);
12. Parking Permitted X:XX AM TO X:XX PM (R7-23);
13. Parking Permitted XX HOURS XX AM - X:XX PM (R7-23a);
14. XX HR PARKING X:XX AM TO X:XX PM (R7-108);
15. NO PARKING ANYTIME/XX HOUR PARKING X:XX AM - X:XX PM (R7-200, R7-200a);
16. TOW AWAY ZONE (R7-201P, R7-201aP);
17. THIS SIDE OF SIGN (R7-202P);
18. EMERGENCY SNOW ROUTE NO PARKING IF OVER XX INCHES (R7-203);
19. NO PARKING ON PAVEMENT (R8-1);
20. NO PARKING EXCEPT ON SHOULDER (R8-2);
21. No Parking (R8-3, R8-3a);
22. EXCEPT SUNDAYS AND HOLIDAYS (R8-3bP);
23. ON PAVEMENT (R8-3cP);
24. ON BRIDGE (R8-3dP);
25. ON TRACKS (R8-3eP);
26. EXCEPT ON SHOULDER (R8-3fP);
27. LOADING ZONE (R8-3gP);
28. X:XX AM TO X:XX PM (R8-3hP);
29. EMERGENCY PARKING ONLY (R8-4);
30. NO STOPPING ON PAVEMENT (R8-5);
31. NO STOPPING EXCEPT ON SHOULDER (R8-6); and
32. EMERGENCY STOPPING ONLY (R8-7).



R7-1 R7-2 R7-2a R7-3



R7-4 R7-5 R7-6 R7-7



R7-8m



R7-8bP



R7-20



R7-21 R7-21a R7-22 R7-23



R7-23a



R7-107



R7-107a



R7-108



R7-200



R7-200a



R7-201P



R7-201aP



R7-202P



R7-203



R8-1



R8-2



R8-3



R8-3a



R8-3bP



R8-3cP



R8-3dP



R8-3eP



R8-3fP



R8-3gP



R8-3hP



R8-3mP



R8-5



R8-6



R8-4



R8-7

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OPTION:

The following signs may be used as an alternate for the R10-3 and R10-4 signs:

- A. Push Button to Cross Street Wait for Walk Signal (R10-3a); or
- B. Push Button to Cross Street Wait for Green Signal (R10-4a).

The name of the street to be crossed may be substituted for the word STREET in the legends on the R10-3a and R10-4a signs.

GUIDANCE:

The finger in the pushbutton symbol on the R10-3, R10-3a, R10-4, and R10-4a signs should point in the same direction as the arrow on the sign.

OPTION:

Where symbol-type pedestrian signal indications are used, an educational sign (R10-3b) may be used instead of the R10-3 sign to improve pedestrian understanding of pedestrian indications at signalized intersections. Where word-type pedestrian signal indications are being retained for the remainder of their useful service life, the legends WALK/DONT WALK may be substituted for the symbols on the educational sign R10-3b, thus creating educational sign R10-3c. The R10-3d educational sign may be used to inform pedestrians that the pedestrian clearance time is sufficient only for the pedestrian to cross to the median at locations where pedestrians cross in two stages using a median refuge island. The R10-3e educational sign may be used where countdown pedestrian signals have been provided. In order to assist the pedestrian in understanding which pushbutton to push, the R10-3f to R10-3i educational signs that provide the name of the street to be crossed may be used instead of the R10-3b to R10-3e educational signs.

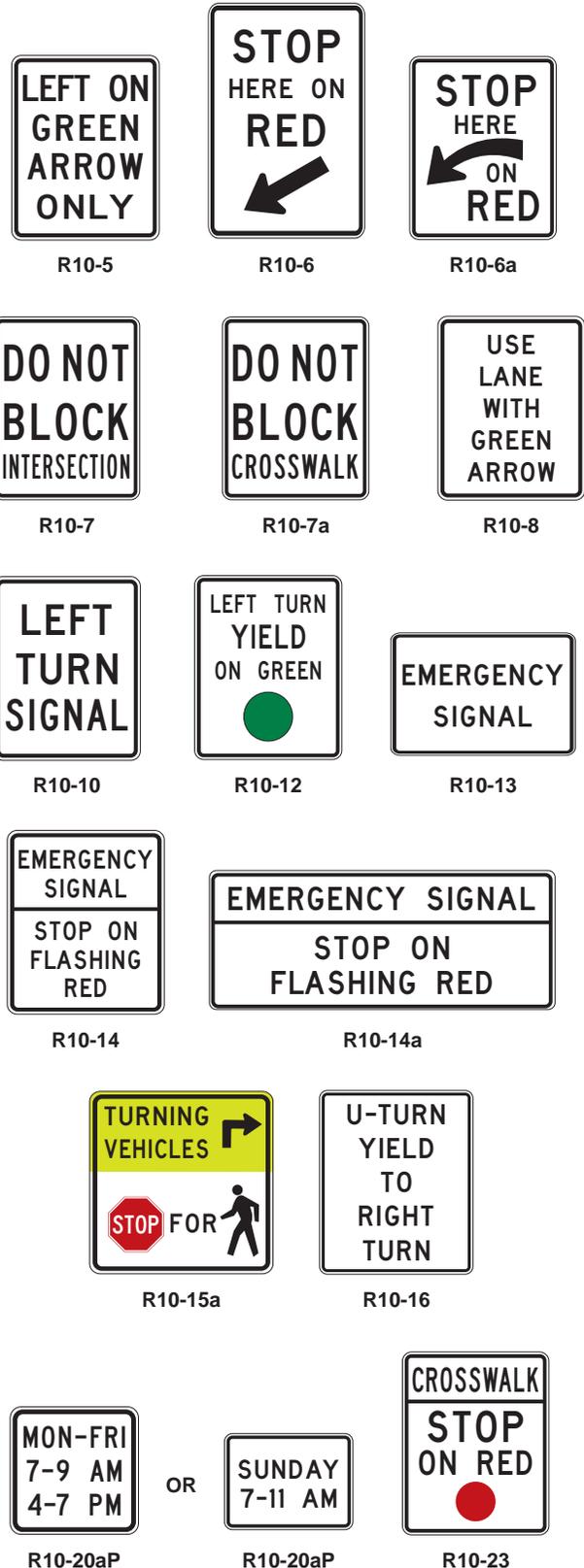
The R10-24 or R10-26 sign (see Section 9B.11) may be used where a pushbutton detector has been installed exclusively to actuate a green phase for bicyclists.

The R10-25 sign may be used where a pushbutton detector has been installed for pedestrians to activate In-Roadway Warning Lights (see Chapter 4N) or flashing beacons that have been added to the pedestrian warning signs.

SUPPORT:

Section 4E.8 contains information regarding the application of the R10-32P plaque.

2B.53 Traffic Signal Signs (R10-5 through R10-30)



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R10-27



R10-31P

OPTION:

To supplement traffic signal control, Traffic Signal signs R10-5 through R10-30 may be used to regulate road users.

Traffic Signal signs may be installed at certain locations to clarify signal control. Among the legends that may be used for this purpose are LEFT ON GREEN ARROW ONLY (R10-5), STOP HERE ON RED (R10-6 or R10-6a) for observance of stop lines, DO NOT BLOCK INTERSECTION (R10-7) and DO NOT BLOCK CROSSWALK (R10-7a) for avoidance of traffic obstructions, USE LANE(S) WITH GREEN ARROW (R10-8) for obedience to Lane Control signals, LEFT TURN YIELD ON GREEN (symbolic circular green) (R10-12) and LEFT TURN YIELD ON FLASHING RED ARROW AFTER STOP (R10-27).

GUIDANCE:

If used, the LEFT ON GREEN ARROW ONLY (R10-5) sign, the LEFT TURN YIELD ON GREEN (symbolic circular green) (R10-12) sign, or the LEFT TURN YIELD ON FLASHING RED ARROW AFTER STOP (R10-27) sign should be located adjacent to the left-turn signal face.

OPTION:

If needed for additional emphasis, an additional LEFT TURN YIELD ON GREEN (symbolic circular green) (R10-12) sign with an AT SIGNAL (R10-31P) supplemental plaque may be installed in advance of the intersection.

In situations where traffic control signals are coordinated for progressive timing, the Traffic Signal Speed (I1-1) sign may be used (see Section 2H.3).

STANDARD:

The CROSSWALK STOP ON RED (symbolic circular red) (R10-23) sign shall only be used in conjunction with pedestrian hybrid beacons (see Section 4F.2).

The EMERGENCY SIGNAL (R10-13) sign shall be used in conjunction with emergency-vehicle traffic control signals (see Section 4G.2).

The EMERGENCY SIGNAL-STOP ON FLASHING RED (R10-14 or R10-14a) sign shall be used in conjunction with emergency-vehicle hybrid beacons (see Section 4G.4).

OPTION:

In order to remind drivers who are making turns to yield to pedestrians, a Turning Vehicles Yield to Pedestrians (R10-15) sign may be used.

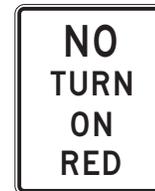
A U-TURN YIELD TO RIGHT TURN (R10-16) sign may be installed near the left-turn signal face if U-turns are allowed on a protected left-turn movement on an approach from which a right-turn GREEN ARROW signal indication is simultaneously being displayed to drivers making a right turn from the conflicting approach to their left.

A STATE LAW plaque (R4-X5) may be installed above these signs to remind road users that the regulation applies at all locations.

2B.54 No Turn on Red Signs (R10-11 Series, and R10-30)



R10-11



R10-11a



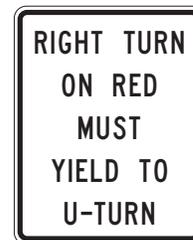
R10-11b



R10-11c



R10-11d



R10-30

STANDARD:

Where a right turn on red (or a left turn on red from a one-way street to a one-way street) is to be prohibited, a symbolic NO TURN ON RED (symbolic circular red) (R10-11) sign or a NO TURN ON RED (R10-11a, R10-11b) word message sign shall be used.

GUIDANCE:

If used, the NO TURN ON RED sign should be installed near the appropriate signal head.

A NO TURN ON RED sign should be considered when an engineering study finds that one or more of the following conditions exists:

- A. Inadequate sight distance to vehicles approaching from the left (or right, if applicable);
- B. Geometrics or operational characteristics of the intersection that might result in unexpected conflicts;
- C. An exclusive pedestrian phase;
- D. An unacceptable number of pedestrian conflicts with right-turn-on-red maneuvers, especially involving children, older pedestrians, or persons with disabilities; and
- E. More than three right-turn-on-red accidents reported in a 12-month period for the particular approach.
- F. The skew angle of the intersecting roadways creates difficulty for drivers to see traffic approaching from their left.

OPTION:

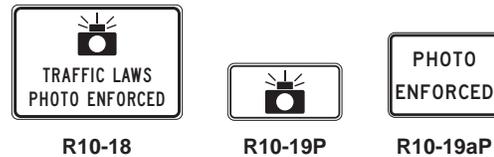
A supplemental R10-20aP plaque showing times of day (similar to the S4-1P plaque shown in Figure 7B-1) with a black legend and border on a white background may be mounted below a No Turn on Red sign to indicate that the restriction is in place only during certain times.

Alternatively, a blank-out sign may be used instead of a static NO TURN ON RED sign, to display either the NO TURN ON RED legend or the No Right Turn symbol or word message, as appropriate, only at certain times during the day or during one or more portion(s) of a particular cycle of the traffic signal.

On signalized approaches with more than one right-turn lane, a NO TURN ON RED EXCEPT FROM RIGHT LANE (R10-11c) sign may be post-mounted at the intersection or a NO TURN ON RED FROM THIS LANE (with down arrow) (R10-11d) sign may be mounted directly over the center of the lane from which turns on red are prohibited.

A RIGHT TURN ON RED MUST YIELD TO U-TURN (R10-30) sign may be installed to remind road users that they must yield to conflicting u-turn traffic on the street or highway onto which they are turning right on a red signal after stopping.

2B.55 Photo Enforced Signs and Plaques (R10-18, R10-19P, R10-19aP)



OPTION:

A TRAFFIC LAWS PHOTO ENFORCED (R10-18) sign may be installed at a jurisdictional boundary to advise road users that some of the traffic regulations within that jurisdiction are being enforced by photographic equipment.

A Photo Enforced (R10-19P) plaque or a PHOTO ENFORCED (R10-19aP) word message plaque may be mounted below a regulatory sign to advise road users that the regulation is being enforced by photographic equipment.

STANDARD:

If used below a regulatory sign, the Photo Enforced (R10-19P or R10-19aP) plaque shall be a rectangle with a black legend and border on a white background.

2B.56 Ramp Metering Signs (R10-28a and R10-29a)



OPTION:

When ramp control signals (see Chapter 4I) are used to meter traffic on a freeway or expressway entrance ramp, regulatory signs with legends appropriate to the control may be installed adjacent to the ramp control signal faces.

For entrance ramps with only one controlled lane, an XX VEHICLE(S) PER GREEN (R10-28) sign may be used to inform road users of the number of vehicles that are permitted to proceed during each short display of the green signal indication. For entrance ramps with more than one controlled lane, an XX VEHICLE(S) PER GREEN Each Lane (R10-29) sign may be used to inform road users of the number of vehicles that are permitted to proceed from each lane during each short display of the green signal indication.

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2B.57 KEEP OFF MEDIAN Sign (R11-1)



R11-1

OPTION:

The KEEP OFF MEDIAN (R11-1) sign may be used to prohibit driving into or parking on the median.

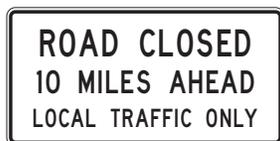
GUIDANCE:

The KEEP OFF MEDIAN sign should be installed on the left of the roadway within the median at random intervals as needed wherever there is a tendency for encroachment.

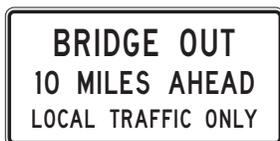
2B.58 ROAD CLOSED Sign (R11-2) and LOCAL TRAFFIC ONLY Signs (R11-3 Series, R11-4)



R11-2



R11-3a



R11-3b



R11-4

GUIDANCE:

The ROAD CLOSED (R11-2) sign should be installed where roads have been closed to all traffic (except authorized vehicles).

ROAD CLOSED - LOCAL TRAFFIC ONLY (R11-3) or ROAD CLOSED TO THRU TRAFFIC (R11-4) signs should be used where through traffic is not permitted, or for a closure some distance beyond the sign, but where the highway is open for local traffic up to the point of closure.

STANDARD:

The Road Closed (R11-2, R11-3 series, and R11-4) signs shall be designed as horizontal rectangles. These signs shall be preceded by the applicable Advance Road Closed

warning sign with the secondary legend AHEAD and, if applicable, an Advance Detour warning sign (see Section 6F.19).

OPTION:

An intersecting street name or a well-known destination may be substituted for the XX MILES AHEAD legend in urban areas.

The word message BRIDGE OUT or RAMP CLOSED may be substituted for the ROAD CLOSED legend where applicable.

2B.58.1 Bridge Closed Signs (R11-2a and R11-3c)



R11-2a



R11-3c

GUIDANCE:

The BRIDGE CLOSED (R11-2a) sign should be installed where a bridge has been closed to all traffic.

BRIDGE CLOSED - LOCAL TRAFFIC ONLY (R11-3c) sign should be used where through traffic is not permitted, or for a closure some distance beyond the sign, but where the highway is open for local traffic up to the point of closure.

STANDARD:

These signs shall be designed as horizontal rectangles. They shall be preceded by the applicable Advance Bridge Closed warning sign with the secondary legend AHEAD and, if applicable, an Advance Detour warning sign (see Section 6F.19).

2B.58.2 Sidewalk Closed Signs (R9-9, R9-10)



R9-9



R9-10

GUIDANCE:

The Sidewalk Closed signs should be used where pedestrian flow is restricted or rerouted due to road work. The SIDEWALK CLOSED sign (R9-9) should be installed at the beginning of the closed sidewalk section and elsewhere along the closed section as needed. The SIDEWALK CLOSED USE OTHER SIDE sign (R9-10) should be installed at the beginning of the restricted sidewalk section when a parallel sidewalk exists on the other side of the roadway.

These signs are typically installed on a barricade device to act as a reminding message to encourage compliance.

2B.59 Weight Limit Signs (R12-1 through R12-5)



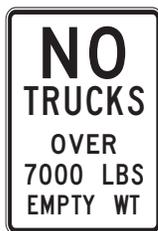
R12-1



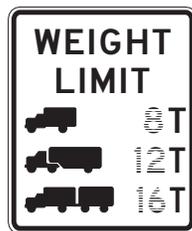
R12-2



R12-4



R12-3



R12-5

OPTION:

The Weight Limit (R12-1) sign carrying the legend WEIGHT LIMIT XX TONS may be used to indicate vehicle weight restrictions including load.

Where the restriction applies to axle weight rather than gross load, the legend may be AXLE WEIGHT LIMIT XX TONS or AXLE WEIGHT LIMIT XXXX LBS (R12-2).

To restrict trucks of certain sizes by reference to empty weight in residential areas, the legend may be NO TRUCKS OVER XX TONS EMPTY WT or NO TRUCKS OVER XX LBS EMPTY WT (R12-3).

In areas where multiple regulations of the type described in the three previous paragraphs are applicable, a sign combining the necessary messages on a single sign may be used, such as WEIGHT LIMIT XX TONS PER AXLE, XX TONS GROSS (R12-4).

Posting of specific load limits may be accomplished by use of the Weight Limit symbol sign (R12-5). A sign containing the legend WEIGHT LIMIT on the top two lines, and showing three different truck symbols and their respective weight limits for which restrictions apply may be used, with the weight limits displayed to the right of each symbol as XX T. A bottom line of legend stating GROSS WT may be included if needed for enforcement purposes.

STANDARD:

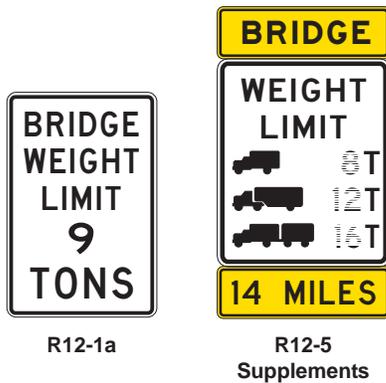
If used, the Weight Limit sign shall be located in advance of the applicable section of highway or structure.

If used, the Bridge Weight Limit sign (R12-5) shall be installed on or immediately in advance of bridges or bridge structures where it is necessary to limit the load permitted on that structure. The proper weights to display on the sign shall be based on an engineering study.

GUIDANCE:

If used, the Weight Limit sign with an advisory distance ahead legend should be placed at approach road intersections or other points where prohibited vehicles can detour or turn around.

**2B.59.1 Bridge and Structure Weight, Width and Height Restriction Signs
(R12-1a, R12-5 Supplement, R12.X2, R12-X4, and R12-X4A)**

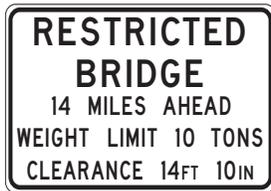


R12-1a

R12-5
Supplements



R12-X2



R12-X4



R12-X4a

STANDARD:

These signs shall be installed in advance of bridges or structures where it is necessary to limit the weight permitted on the bridge or structure and/or to show the clearance available on or below the bridge or structure:

1. BRIDGE WEIGHT LIMIT (x) TONS (R12-1a)
2. BRIDGE - WEIGHT LIMIT (w/symbols) - xx MILES (R12-5 Supplement)
3. RESTRICTED BRIDGE (xx) MILES AHEAD WEIGHT LIMIT (X) TONS (R12-X4)
4. RESTRICTED BRIDGE (xx) MILES AHEAD WEIGHT LIMIT (X) TONS - CLEARANCE (xx) FT. (XX) IN. (R12-X4)
5. RESTRICTED BRIDGE (xx) MILES AHEAD CLEARANCE (xx) FT. (xx) IN. (R12-X4a)

The weights to display on the sign shall be the same weights displayed on the Bridge Weight Limit sign (see Section 2B.59).

GUIDANCE:

These signs should be placed at the nearest intersecting roadway where a motorist can detour around the restriction or at wide point in the roadway so that the motorist can turn around to avoid the restriction.

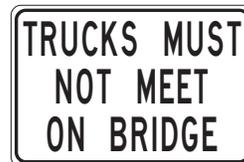
STANDARD:

When a bridge is restricted for specific load limits, the Weight Limit symbol sign (R12-5) shall be installed immediately in advance of the bridge.

The R12-5 Supplement combination sign consists of a BRIDGE plaque installed above and a (xx) MILES plaque installed below the Weight Limit symbol sign to present a message to the motorist that is consistent with the advance warning sign assembly.

Both plaques shall have a black legend on a yellow reflectorized background. The length of the plaques shall match that of the Weight Limit symbol sign.

When a restriction on a bridge applies to the gross load of a vehicle, the BRIDGE WEIGHT LIMIT sign (R12-1a) shall be installed immediately in advance of the bridge. If an advance warning sign is to be used, the (xx) MILES plaque of the R12-5 Supplement sign combination shall be installed below the R12-1a sign. The plaque shall have a black legend on a yellow reflectorized background and shall match the length of the R12-1a sign.



R12-X3



R12-X3a

GUIDANCE:

The TRUCKS MUST NOT MEET ON BRIDGE sign (R12-X3) should be installed on two-way roadways in advance of bridges or structures:

1. Where the clear opening width is greater than 18 feet and less than 20 feet, the approach alignment is poor and the structure type is such that commercial vehicles cannot pass safely on the structure, or
2. Where a restriction on the meeting or passing of commercial vehicles would provide increased load capacity upon the structure.

The VEHICLES MUST NOT MEET ON BRIDGE sign (R12-X3a) should be installed on two-way roadways in advance of one-lane bridges or structures where the clear opening width is less than 16 feet. The WEIGHT RESTRICTION AHEAD sign (W14-X3) should be installed in advance of the bridge weight limit signs.

2B.60 Weigh Station Signs (R13 Series)



R13-1



R13-1

GUIDANCE:

An R13-1 sign with the legend TRUCKS OVER XX TONS MUST ENTER WEIGH STATION NEXT RIGHT should be used to direct appropriate traffic into a weigh station.

The R13-1 sign should be supplemented by the D8 series of guide signs (see Section 2D.49).

OPTION:

The reverse color combination, a white legend and border on a black background, may be used for the R13-1 sign.

2B.61 Truck Route Sign (R14-1)



R14-1



M4-4

GUIDANCE:

The TRUCK ROUTE (R14-1) sign should be used to mark a route that has been designated to allow truck traffic.

OPTION:

On a numbered highway, the TRUCK auxiliary (M4-4) sign may be used (see Section 2D.20).

2B.62 Hazardous Material Signs (R14-2, R14-3)



R14-2



R14-3

OPTION:

The Hazardous Material Route (R14-2) sign may be used to identify routes that have been designated by proper authority for vehicles transporting hazardous material.

On routes where the transporting of hazardous material is prohibited, the Hazardous Material Prohibition (R14-3) sign may be used.

GUIDANCE:

If used, the Hazardous Material Prohibition sign should be installed on a street or roadway at a point where vehicles transporting hazardous cargo have the opportunity to take an alternate route.

2B.63 National Network Signs (R14-4, R14-5)



R14-4



R14-5

SUPPORT:

The signing of the National Network routes for trucking is optional.

STANDARD:

When a National Network route is signed, the National Network (R14-4) sign shall be used.

OPTION:

The National Network Prohibition (R14-5) sign may be used to identify routes, portions of routes, and ramps where trucks are prohibited. The R14-5 sign may also be used to mark the ends of designated routes.

2B.64 Headlight Use Signs (R16-5 through R16-11)



R16-5

R16-6

R16-8



R16-7

R16-9



R16-10

R16-11

SUPPORT:

Some States require road users to turn on their vehicle headlights under certain weather conditions, as a safety improvement measure on roadways experiencing high crash rates, or in special situations such as when driving through a tunnel.

Figure 2B-31 shows the various signs that can be used for informing motorists of these requirements.

OPTION:

A LIGHTS ON WHEN USING WIPERS (R16-5) sign or a LIGHTS ON WHEN RAINING (R16-6) sign may be installed to inform road users of State laws regarding headlight use. Although these signs are typically installed facing traffic entering the State just inside the State border, they also may be installed at other locations within the State.

GUIDANCE:

If a particular section of roadway has been designated as a safety improvement zone within which headlight use is required, a TURN ON HEADLIGHTS NEXT XX MILES (R16-7) sign or a BEGIN DAYTIME HEADLIGHT SECTION (R16-10) sign should be installed at the upstream end of the section, and a END DAYTIME HEADLIGHT SECTION (R16-11) sign should be installed at the downstream end of the section.

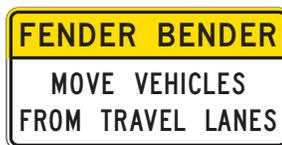
OPTION:

A TURN ON HEADLIGHTS (R16-8) sign may be installed to require road users to turn on their headlights in special situations such as when driving through a tunnel. A CHECK HEADLIGHTS (R16-9) sign may be installed downstream from the special situation to inform drivers that the using their headlights is no longer required.

2B.65 FENDER BENDER Sign (R16-4)

OPTION:

A FENDER BENDER MOVE VEHICLES FROM TRAVEL LANES (R16-4) sign may be installed to require motorists to move their vehicle out of the travel lanes if they have been involved in a crash.



R16-4



Seat Belt Symbol

2B.66 Seat Belt Symbol

STANDARD:

When a seat belt symbol is used, the symbol shown in Figure 2B-32 shall be used.

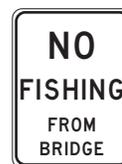
GUIDANCE:

The seat belt symbol should not be used alone. If used, the seat belt symbol should be incorporated into regulatory sign messages for mandatory seat belt use.

2B.66.1 Other Regulatory Signs



R16-X6



R16-X10



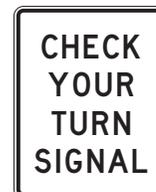
R16-X12



R16-X8



R16-X13



R16-X33

OPTION:

Regulatory word message signs other than those shown in this Manual, the Mn/DOT "Standard Signs Manual", and the Federal "Standard Highways Sign and Markings" book may be developed to aid the enforcement of other laws or regulations.

GUIDANCE:

The Seat Belts Fastened sign (R16-X12) should be used wherever it is determined that the need exists to remind motorists to fasten their seat belts.

Sign or Plaque	Sign Designation	Section	Conventional Road		Expressway	Freeway	Minimum	Oversized
			Single Lane	Multi-Lane				
Horizontal Alignment	W1-1,2,3,4,5	2C.7	30 x 30	36 x 36	36 x 36	36 x 36	---	48 x 48
Combination Horizontal Alignment/Advisory Speed	W1-1a,2a	2C.10	36 x 36	36 x 36	48 x 48	48 x 48	---	48 x 48
One-Direction Large Arrow	W1-6	2C.12	48 x 24	48 x 24	60 x 30	60 x 30	---	60 x 30
Two-Direction Large Arrow	W1-7	2C.47	48 x 24	48 x 24	---	---	---	60 x 30
Chevron Alignment	W1-8	2C.9	18 x 24	18 x 24	30 X 36	36 x 48	---	24 x 30
Combination Horizontal Alignment/Intersection	W1-10,10a,10b,10c,10d,10e	2C.11	36 x 36	36 x 36	36 x 36	48 x 48	---	---
Hairpin Curve	W1-11	2C.7	30 x 30	30 x 30 *	36 x 36	48 X 48	---	48 x 48
Truck Rollover	W1-13	2C.13	36 x 36	36 x 36	36 x 36	48 X 48	---	36 x 36
270-degree Loop	W1-15	2C.7	30 x 30	30 x 30 *	36 x 36	48 X 48	---	48 x 48
Intersection Warning	W2-1,2,3,4,5,6,7,8,X1,X12	2C.46	30 x 30	30 x 30 *	36 x 36	---	24 x 24	48 x 48
Stop, Yield, and Signal Ahead	W3-1,2,3	2C.36	30 x 30	30 x 30 *	48 x 48	48 x 48	30 x 30	---
Be Prepared To Stop	W3-4	2C.36	36 x 36	36 x 36	48 x 48	48 x 48	30 x 30	---
Reduced Speed Limit Ahead	W3-5	2C.38	36 x 36	36 x 36	48 x 48	48 x 48	---	---
XX MPH Speed Zone Ahead	W3-5a	2C.38	36 x 36	36 x 36	48 x 48	48 x 48	---	---
Draw Bridge	W3-6	2C.39	36 x 36	36 x 36	48 x 48	---	---	60 x 60
Ramp Meter Ahead	W3-7	2C.37	36 x 36	36 x 36	---	---	---	---
Ramp Metered When Flashing	W3-8	2C.37	36 x 36	36 x 36	---	---	---	---
Prepare to Stop When Flashing	W3-X4	2C.36	66 x 42	66 x 42	66 x 42	---	66 x 42	66 x 42
Merging Traffic	W4-1	2C.40	36 x 36	36 x 36	48 x 48	48 x 48	30 x 30	---
Lane Ends	W4-2	2C.42	36 x 36	36 x 36	48 x 48	48 x 48	30 x 30	---
Added Lane	W4-3	2C.41	36 x 36	36 x 36	48 x 48	48 x 48	30 x 30	---
Cross Traffic Does Not Stop (plaque)	W4-4P	2C.59	24 x 12	24 x 12	36 x 18	---	---	48 x 24
Traffic from Left (Right) Does Not Stop (plaque)	W4-4aP	2C.59	24 x 12	24 x 12	36 x 18	---	---	48 x 24
Oncoming Traffic Does Not Stop (plaque)	W4-4bP	2C.59	24 x 12	24 x 12	36 x 18	---	---	48 x 24
Entering Roadway Merge	W4-5	2C.40	36 x 36	36 x 36	48 x 48	---	---	---
No Merge Area (plaque)	W4-5P	2C.40	18 x 24	18 x 24	24 x 30	---	---	---
Entering Roadway Added Lane	W4-6	2C.41	36 x 36	36 x 36	48 x 48	---	---	---
Road Narrows	W5-1	2C.19	36 x 36	36 x 36	48 x 48	48 x 48	30 x 30	---
Narrow Bridge	W5-2	2C.20	36 x 36	36 x 36	48 x 48	48 x 48	30 x 30	---
One Lane Bridge	W5-3	2C.21	36 x 36	36 x 36	48 x 48	48 x 48	30 x 30	---
Shoulder Narrows	W5-X1	2C.31	36 x 36	36 x 36	48 x 48	48 x 48	---	---
Divided Highway	W6-1	2C.22	36 x 36	36 x 36	48 x 48	48 x 48	---	---
Divided Highway Ends	W6-2	2C.23	36 x 36	36 x 36	48 x 48	48 x 48	---	---
Two-Way Traffic	W6-3	2C.44	36 x 36	36 x 36	48 x 48	48 x 48	---	---
Hill	W7-1	2C.16	30 x 30	36 x 36	36 x 36	36 x 36	24 x 24	48 x 48
Hill with Grade	W7-1a	2C.16	30 x 30	36 x 36	36 x 36	36 x 36	24 x 24	48 x 48
Use Low Gear (plaque)	W7-2P	2C.57	24 x 18	24 x 18	---	---	---	---
Trucks Use Lower Gear (plaque)	W7-2bP	2C.57	24 x 18	24 x 18	---	---	---	---
XX% Grade (plaque)	W7-3P	2C.57	24 x 18	24 x 18	---	---	---	---
Next XX Miles (plaque)	W7-3aP	2C.55	24 x 18	24 x 18	---	---	---	---
XX% Grade, XX Miles (plaque)	W7-3bP	2C.57	24 x 18	24 x 18	---	---	---	---

Table 2C-2 Warning Sign and Plaque Sizes (Sheet 1 of 3)

Sign or Plaque	Sign Designation	Section	Conventional Road		Expressway	Freeway	Minimum	Oversized
			Single Lane	Multi-Lane				
Runaway Truck Ramp XX Miles	W7-4	2C.17	78 x 48	78 x 48	78 x 48	78 x 48	---	---
Runaway Truck Ramp (w/arrow)	W7-4b	2C.17	78 x 60	78 x 60	78 x 60	78 x 60	---	---
Truck Escape Ramp	W7-4c	2C.17	78 x 60	78 x 60	78 x 60	78 x 60	---	---
Sand, Gravel, Paved (plaque)	W7-4dP,4eP,4fP	2C.17	24 x 12	24 x 12	24 x 12	24 x 12	---	---
Hill Blocks View	W7-6	2C.18	30 x 30	36 x 36	36 x 36	---	---	48 x 48
Bump or Dip	W8-1,1a,1b,2	2C.28	30 x 30	36 x 36	36 x 36	48 x 48	24 x 24	48 x 48
Pavement Ends	W8-3	2C.30	36 x 36	36 x 36	48 x 48	---	30 x 30	---
Soft Shoulder	W8-4	2C.31	36 x 36	36 x 36	48 x 48	48 x 48	24 x 24	48 x 48
Slippery When Wet	W8-5	2C.32	30 x 30	36 x 36	36 x 36	48 x 48	24 x 24	48 x 48
Road Condition (plaques)	W-5P,5bP,5cP	2C.32	24 x 18	24 x 18	30 x 24	36 x 30	---	36 x 30
Ice	W8-5aP	2C.32	24 x 12	24 x 12	30 x 18	30 x 18	---	---
Truck Crossing	W8-6	2C.49	36 x 36	36 x 36	36 x 36	48 x 48	24 x 24	48 x 48
Loose Gravel	W8-7	2C.32	36 x 36	36 x 36	36 x 36	---	24 x 24	48 x 48
Rough Road	W8-8	2C.32	36 x 36	36 x 36	36 x 36	48 x 48	24 x 24	48 x 48
Low Shoulder	W8-9	2C.31	36 x 36	36 x 36	36 x 36	48 x 48	24 x 24	48 x 48
Uneven Lanes	W8-11	2C.32	36 x 36	36 x 36	36 x 36	48 x 48	---	48 x 48
No Center Line	W8-12	2C.34	36 x 36	36 x 36	36 x 36	48 x 48	---	---
Bridge Ices Before Road	W8-13	2C.32	36 x 36	36 x 36	36 x 36	48 x 48	24 x 24	48 x 48
Fallen Rocks	W8-14	2C.32	30 x 30	30 x 30 *	36 x 36	48 x 48	24 x 24	48 x 48
Grooved Pavement	W8-15	2C.33	30 x 30	30 x 30 *	36 x 36	48 x 48	24 x 24	48 x 48
Motorcycle (plaque)	W8-15P	2C.33	24 x 18	24 x 18	30 x 24	36 x 30	---	36 x 30
Metal Bridge Deck	W8-16	2C.33	30 x 30	30 x 30 *	36 x 36	48 x 48	24 x 24	48 x 48
Shoulder Drop-Off (symbol)	W8-17	2C.31	30 x 30	30 x 30 *	36 x 36	48 x 48	24 x 24	48 x 48
Shoulder Drop-Off (plaque)	W8-17P	2C.31	24 x 18	24 x 18	24 x 18	36 x 30	---	36 x 30
Road May Flood	W8-18	2C.35	36 x 36	36 x 36	36 x 36	48 x 48	24 x 24	48 x 48
Flood Gauge	W8-19	2C.35	12 x 72	12 x 72	---	---	---	---
Gusty Winds Area	W8-21	2C.35	36 x 36	36 x 36	36 x 36	48 x 48	24 x 24	48 x 48
Fog Area	W8-22	2C.35	36 x 36	36 x 36	36 x 36	48 x 48	24 x 24	48 x 48
No Shoulder	W8-23	2C.31	36 x 36	36 x 36	36 x 36	48 x 48	24 x 24	48 x 48
Shoulder Ends	W8-25	2C.31	30 x 30	30 x 30 *	36 x 36	48 x 48	24 x 24	48 x 48
Left (Right) Lane Ends	W9-1	2C.42	36 x 36	36 x 36	36 x 36	48 x 48	30 x 30	48 x 48
Lane Ends Merge Left (Right)	W9-2	2C.42	36 x 36	36 x 36	36 x 36	48 x 48	30 x 30	48 x 48
Right (Left) Lane Exit Only Ahead	W9-7	2C.43	132 x 72	132 x 72	132 x 72	132 x 72	---	---
Bicycle	W11-1	2C.49	30 x 30	30 x 30 *	36 x 36	---	24 x 24	48 x 48
Pedestrian	W11-2	2C.50	30 x 30	30 x 30 *	36 x 36	---	24 x 24	48 x 48
Large Animals	W11-3,4,16,17,18,19,20,21,22	2C.50	30 x 30	30 x 30 *	36 x 36	---	24 x 24	48 x 48
Farm Vehicle	W11-5,5A	2C.49	30 x 30	30 x 30 *	36 x 36	---	24 x 24	48 x 48
Snowmobile	W11-6	2C.50	30 x 30	30 x 30 *	36 x 36	---	24 x 24	48 x 48
Equestrian	W11-7	2C.50	30 x 30	30 x 30 *	36 x 36	---	24 x 24	48 x 48
Emergency Vehicle	W11-8	2C.49	30 x 30	30 x 30 *	36 x 36	---	24 x 24	48 x 48
Handicapped	W11-9	2C.50	30 x 30	30 x 30 *	36 x 36	---	---	48 x 48
Truck	W11-10	2C.49	30 x 30	30 x 30 *	36 x 36	---	24 x 24	48 x 48
Golf Cart	W11-11	2C.49	30 x 30	30 x 30 *	36 x 36	---	24 x 24	48 x 48
Emergency Signal Ahead (plaque)	W11-12P	2C.49	36 x 30	36 x 30	36 x 30	---	---	---
Horse-Drawn Vehicle	W11-14	2C.49	30 x 30	30 x 30 *	36 x 36	---	24 x 24	48 x 48
Bicycle/Pedestrian	W11-15	2C.49	30 x 30	30 x 30 *	36 x 36	---	24 x 24	48 x 48
Trail Crossing	W11-15a	2C.49	30 x 30	30 x 30 *	36 x 36	---	24 x 24	48 x 48

Table 2C-2 Warning Sign and Plaque Sizes (Sheet 2 of 3)

Sign or Plaque	Sign Designation	Section	Conventional Road		Expressway	Freeway	Minimum	Oversized
			Single Lane	Multi-Lane				
Runaway Truck Ramp XX Miles	W7-4	2C.17	78 x 48	78 x 48	78 x 48	78 x 48	---	---
Runaway Truck Ramp (w/arrow)	W7-4b	2C.17	78 x 60	78 x 60	78 x 60	78 x 60	---	---
Truck Escape Ramp	W7-4c	2C.17	78 x 60	78 x 60	78 x 60	78 x 60	---	---
Sand, Gravel, Paved (plaque)	W7-4dP,4eP,4fP	2C.17	24 x 12	24 x 12	24 x 12	24 x 12	---	---
Hill Blocks View	W7-6	2C.18	30 x 30	36 x 36	36 x 36	---	---	48 x 48
Bump or Dip	W8-1,1a,1b,2	2C.28	30 x 30	36 x 36	36 x 36	48 x 48	24 x 24	48 x 48
Pavement Ends	W8-3	2C.30	36 x 36	36 x 36	48 x 48	---	30 x 30	---
Soft Shoulder	W8-4	2C.31	36 x 36	36 x 36	48 x 48	48 x 48	24 x 24	48 x 48
Slippery When Wet	W8-5	2C.32	30 x 30	36 x 36	36 x 36	48 x 48	24 x 24	48 x 48
Road Condition (plaques)	W-5P,5bP,5cP	2C.32	24 x 18	24 x 18	30 x 24	36 x 30	---	36 x 30
Ice	W8-5aP	2C.32	24 x 12	24 x 12	30 x 18	30 x 18	---	---
Truck Crossing	W8-6	2C.49	36 x 36	36 x 36	36 x 36	48 x 48	24 x 24	48 x 48
Loose Gravel	W8-7	2C.32	36 x 36	36 x 36	36 x 36	---	24 x 24	48 x 48
Rough Road	W8-8	2C.32	36 x 36	36 x 36	36 x 36	48 x 48	24 x 24	48 x 48
Low Shoulder	W8-9	2C.31	36 x 36	36 x 36	36 x 36	48 x 48	24 x 24	48 x 48
Uneven Lanes	W8-11	2C.32	36 x 36	36 x 36	36 x 36	48 x 48	---	48 x 48
No Center Line	W8-12	2C.34	36 x 36	36 x 36	36 x 36	48 x 48	---	---
Bridge Ices Before Road	W8-13	2C.32	36 x 36	36 x 36	36 x 36	48 x 48	24 x 24	48 x 48
Fallen Rocks	W8-14	2C.32	30 x 30	30 x 30 *	36 x 36	48 x 48	24 x 24	48 x 48
Grooved Pavement	W8-15	2C.33	30 x 30	30 x 30 *	36 x 36	48 x 48	24 x 24	48 x 48
Motorcycle (plaque)	W8-15P	2C.33	24 x 18	24 x 18	30 x 24	36 x 30	---	36 x 30
Metal Bridge Deck	W8-16	2C.33	30 x 30	30 x 30 *	36 x 36	48 x 48	24 x 24	48 x 48
Shoulder Drop-Off (symbol)	W8-17	2C.31	30 x 30	30 x 30 *	36 x 36	48 x 48	24 x 24	48 x 48
Shoulder Drop-Off (plaque)	W8-17P	2C.31	24 x 18	24 x 18	24 x 18	36 x 30	---	36 x 30
Road May Flood	W8-18	2C.35	36 x 36	36 x 36	36 x 36	48 x 48	24 x 24	48 x 48
Flood Gauge	W8-19	2C.35	12 x 72	12 x 72	---	---	---	---
Gusty Winds Area	W8-21	2C.35	36 x 36	36 x 36	36 x 36	48 x 48	24 x 24	48 x 48
Fog Area	W8-22	2C.35	36 x 36	36 x 36	36 x 36	48 x 48	24 x 24	48 x 48
No Shoulder	W8-23	2C.31	36 x 36	36 x 36	36 x 36	48 x 48	24 x 24	48 x 48
Shoulder Ends	W8-25	2C.31	30 x 30	30 x 30 *	36 x 36	48 x 48	24 x 24	48 x 48
Left (Right) Lane Ends	W9-1	2C.42	36 x 36	36 x 36	36 x 36	48 x 48	30 x 30	48 x 48
Lane Ends Merge Left (Right)	W9-2	2C.42	36 x 36	36 x 36	36 x 36	48 x 48	30 x 30	48 x 48
Right (Left) Lane Exit Only Ahead	W9-7	2C.43	132 x 72	132 x 72	132 x 72	132 x 72	---	---
Bicycle	W11-1	2C.49	30 x 30	30 x 30 *	36 x 36	---	24 x 24	48 x 48
Pedestrian	W11-2	2C.50	30 x 30	30 x 30 *	36 x 36	---	24 x 24	48 x 48
Large Animals	W11-3,4,16,17,18,19,20,21,22	2C.50	30 x 30	30 x 30 *	36 x 36	---	24 x 24	48 x 48
Farm Vehicle	W11-5,5A	2C.49	30 x 30	30 x 30 *	36 x 36	---	24 x 24	48 x 48
Snowmobile	W11-6	2C.50	30 x 30	30 x 30 *	36 x 36	---	24 x 24	48 x 48
Equestrian	W11-7	2C.50	30 x 30	30 x 30 *	36 x 36	---	24 x 24	48 x 48
Emergency Vehicle	W11-8	2C.49	30 x 30	30 x 30 *	36 x 36	---	24 x 24	48 x 48
Handicapped	W11-9	2C.50	30 x 30	30 x 30 *	36 x 36	---	---	48 x 48
Truck	W11-10	2C.49	30 x 30	30 x 30 *	36 x 36	---	24 x 24	48 x 48
Golf Cart	W11-11	2C.49	30 x 30	30 x 30 *	36 x 36	---	24 x 24	48 x 48
Emergency Signal Ahead (plaque)	W11-12P	2C.49	36 x 30	36 x 30	36 x 30	---	---	---
Horse-Drawn Vehicle	W11-14	2C.49	30 x 30	30 x 30 *	36 x 36	---	24 x 24	48 x 48
Bicycle/Pedestrian	W11-15	2C.49	30 x 30	30 x 30 *	36 x 36	---	24 x 24	48 x 48
Trail Crossing	W11-15a	2C.49	30 x 30	30 x 30 *	36 x 36	---	24 x 24	48 x 48

Table 2C-2 Warning Sign and Plaque Sizes (Sheet 2 of 3)

2C.4 Size of Warning Signs

STANDARD:

Except as provided in Section 2A.11, the sizes for warning signs shall be as shown in Table 2C-2 and in Appendix C at the back of this Manual.

SUPPORT:

Section 2A.11 contains information regarding the applicability of the various columns in Table 2C-2.

STANDARD:

Except as provided in the Option below, the minimum size for all diamond-shaped warning signs facing traffic on a multi-lane conventional road where the posted speed limit is higher than 35 mph shall be 36 x 36 inches.

The minimum size for supplemental warning plaques that are not included in Table 2C-2 shall be as shown in Table 2C-3.

OPTION:

If a diamond-shaped warning sign is placed on the left-hand side of a multi-lane roadway to supplement the installation of the same warning sign on the right-hand side of the roadway, the minimum size identified in the Single Lane column in Table 2C-2 may be used.

Signs and plaques larger than those shown in Appendix C and Tables 2C-2 and 2C-3 may be used (see Section 2A.11).

GUIDANCE:

The minimum size for all diamond-shaped warning signs facing traffic on exit and entrance ramps should be the size identified in Table 2C-2 for the mainline roadway classification (Expressway or Freeway). If a minimum size is not provided in the Freeway Column, the Expressway size should be used. If a minimum size is not provided in the Freeway or the Expressway Column, the Oversized size should be used.

2C.5 Placement of Warning Signs

SUPPORT:

For information on placement of warning signs, see Sections 2A.16 to 2A.21.

The time needed for detection, recognition, decision, and reaction is called the Perception-Response Time (PRT). Table 2C-4 is provided as an aid for determining warning sign location. The distances shown in Table 2C-4 can be adjusted for roadway features, other signing, and to improve visibility.

GUIDANCE:

Warning signs should be placed so that they provide adequate PRT. The distances contained in Table 2C-4 are for guidance purposes and should be applied with engineering judgment. Warning signs should not be placed too far in advance of the condition, such that drivers might tend to forget the warning because of other driving distractions, especially in urban areas.

Minimum spacing between warning signs with different messages should be based on the estimated PRT for driver comprehension of and reaction to the second sign.

The effectiveness of the placement of warning signs should be periodically evaluated under both day and night conditions.

OPTION:

Warning signs that advise road users about conditions that are not related to a specific location, such as Deer Crossing or SOFT SHOULDER, may be installed in an appropriate location, based on engineering judgment, since they are not covered in Table 2C-4.

Size of Warning Sign	Size of Supplemental Plaque			
	Rectangular			Square
	1 Line	2 Lines	Arrow	
24 x 24 30 x 30	24 x 12	24 x 18	24 x 12	18 x 18
36 x 36 48 x 48	30 x 18	30 x 24	30 x 18	24 x 24

- Notes: 1. Larger supplemental plaques may be used when appropriate.
2. Dimensions are in inches and are shown as width x height.

Table 2C-3. Minimum Size of Supplemental Warning Plaques

GUIDANCE:

The advisory speed should be determined based on free-flowing traffic conditions.

Because changes in conditions, such as roadway geometrics, surface characteristics, or sight distance, might affect the advisory speed, each location should be evaluated periodically or when conditions change.

2C.9 Chevron Alignment Sign (W1-8)



W1-8

STANDARD:

The use of the Chevron Alignment (W1-8) sign (see Figure 2C-2) to provide additional emphasis and guidance for a change in horizontal alignment shall be in accordance with the information shown in Table 2C-5.

OPTION:

When used, Chevron Alignment signs may be used instead of or in addition to standard delineators.

STANDARD:

The Chevron Alignment sign shall be a vertical rectangle. No border shall be used on the Chevron Alignment sign.

If used, Chevron Alignment signs shall be installed on the outside of a turn or curve, in line with and at approximately a right angle to approaching traffic. Chevron Alignment signs shall be installed at a minimum height of 4 feet, measured vertically from the bottom of the sign to the elevation of the near edge of the traveled way.

GUIDANCE:

The approximate spacing of Chevron Alignment signs on the turn or curve measured from the point of curvature (PC) should be as shown in Table 2C-6.

If used, Chevron Alignment signs should be visible for a sufficient distance to provide the road user with adequate time to react to the change in alignment.

STANDARD:

Chevron Alignment signs shall not be placed on the far side of a T-intersection facing traffic on the stem approach to warn drivers that a through movement is not physically possible, as this is the function of a Two-Direction (or One-Direction) Large Arrow sign.

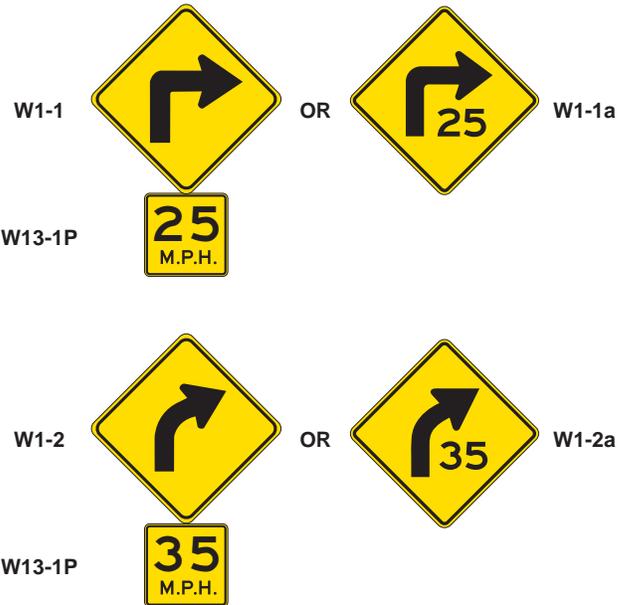
Advisory Speed	Curve Radius	Sign Spacing
15 mph or less	Less than 200 feet	40 feet
20 to 30 mph	200 to 400 feet	80 feet
35 to 45 mph	401 to 700 feet	120 feet
50 to 60 mph	701 to 1250 feet	160 feet
More than 60 mph	More than 1250 feet	200 feet

Note: The relationship between the curve radius and the advisory speed shown in this table should not be used to determine the advisory speed.

Table 2C-6. Typical Spacing of Chevron Alignment Signs on Horizontal Curves

Chevron Alignment signs shall not be used to mark obstructions within or adjacent to the roadway, including the beginning of guardrails or barriers, as this is the function of an object marker (see Section 2C.63).

2C.10 Combination Horizontal Alignment/Advisory Speed Signs (W1-1a, W1-2a)



OPTION:

The Turn (W1-1) sign or the Curve (W1-2) sign may be combined with the Advisory Speed (W13-1P) plaque (see Section 2C.8) to create a combination Turn/Advisory Speed (W1-1a) sign or combination Curve/Advisory Speed (W1-2a) sign.

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The combination Horizontal Alignment/Advisory Speed sign (W1-6 and W1-2a) may be used to supplement the advance Horizontal Alignment warning sign and Advisory Speed plaque based upon an engineering study.

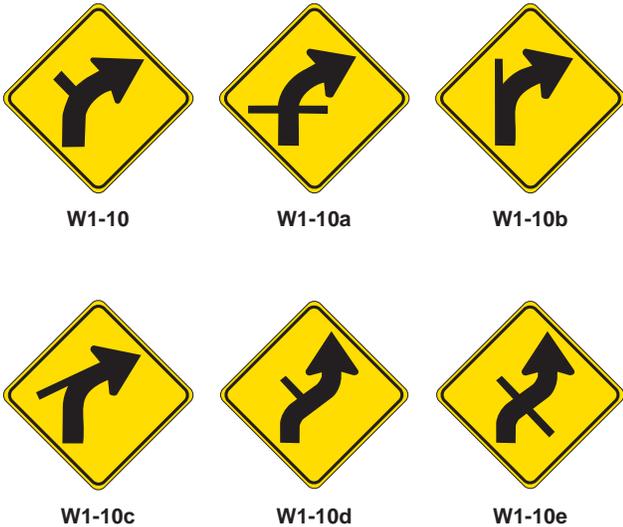
STANDARD:

If used, the combination Horizontal Alignment/Advisory Speed sign shall not be used alone and shall not be used as a substitute for a Horizontal Alignment warning sign and Advisory Speed plaque at the advance warning location. The combination Horizontal Alignment/Advisory Speed sign shall only be used as a supplement to the advance Horizontal Alignment warning sign. If used, the combination Horizontal Alignment/Advisory Speed sign shall be installed at the beginning of the turn or curve.

GUIDANCE:

The advisory speed displayed on the combination Horizontal Alignment/Advisory Speed sign should be based on the advisory speed for the horizontal curve using recommended engineering practices (see Section 2C.8).

2C.11 Combination Horizontal Alignment/Intersection Signs (W1-10 Series)



OPTION:

The symbols from the Turn (W1-1) sign or the Curve (W1-2) sign may be combined with the symbols from the Cross Road (W2-1) sign or the Side Road (W2-2 or W2-3) sign to create a combination Horizontal Alignment/Intersection (W1-10 series) sign that depicts the condition where an intersection within or immediately adjacent to a turn or curve.

GUIDANCE:

Elements of the combination Horizontal Alignment/Intersection sign related to horizontal alignment should comply with the provisions of Section 2C.7, and elements related to intersection configuration should comply with the provisions of Section 2C.46. The symbol design should approximate the configuration of the intersecting roadway(s). No more than one Cross Road or two Side Road symbols should be displayed on any one combination Horizontal Alignment/Intersection sign.

STANDARD:

The use of the combination Horizontal Alignment/Intersection sign shall be in accordance with the appropriate Turn or Curve sign information shown in Table 2C-5.

2C.12 One-Direction Large Arrow Sign (W1-6)



W1-6

OPTION:

A One-Direction Large Arrow (W1-6) sign may be used either as a supplement or alternative to Chevron Alignment signs in order to delineate a change in horizontal alignment (see Figure 2C-2).

A One-Direction Large Arrow (W1-6) sign may be used to supplement a Turn or Reverse Turn sign (see Figure 2C-2) to emphasize the abrupt curvature.

STANDARD:

The One-Direction Large Arrow sign shall be a horizontal rectangle with an arrow pointing to the left or right.

The use of the One-Direction Large Arrow sign shall be in accordance with the information shown in Table 2C-5.

If used, the One-Direction Large Arrow sign shall be installed on the outside of a turn or curve in line with and at approximately a right angle to approaching traffic.

The One-Direction Large Arrow sign shall not be used where there is no alignment change in the direction of travel, such as at the beginnings and ends of medians or at center piers.

The One-Direction Large Arrow sign directing traffic to the right shall not be used in the central island of a roundabout.

GUIDANCE:

If used, the One-Direction Large Arrow sign should be visible for a sufficient distance to provide the road user with adequate time to react to the change in alignment.

2C.13 Truck Rollover Warning Sign (W1-13)



W1-13

OPTION:

A Truck Rollover Warning (W1-13) sign may be used to warn drivers of vehicles with a high center of gravity, such as trucks, tankers, and recreational vehicles, of a curve or turn where geometric conditions might contribute to a loss of control and a rollover as determined by an engineering study.

SUPPORT:

Among the established engineering practices that are appropriate for the determination of the truck rollover potential of a horizontal curve are the following:

- A. An accelerometer that provides a direct determination of side friction factors
- B. A design speed equation
- C. A traditional ball-bank indicator using 10 degrees of ball-bank

STANDARD:

If a Truck Rollover Warning (W1-13) sign is used, it shall be accompanied by an Advisory Speed (W13-1P) plaque indicating the recommended speed for vehicles with a higher center of gravity.

OPTION:

The Truck Rollover Warning sign may be displayed as a static sign, as a static sign supplemented by a flashing warning beacon, or as a changeable message sign activated by the detection of an approaching vehicle with a high center of gravity that is traveling in excess of the recommended speed for the condition.

SUPPORT:

The curved arrow on the Truck Rollover Warning sign shows the direction of roadway curvature. The truck tips in the opposite direction.

2C.14 Advisory Exit and Ramp Speed Signs (W13-2, W13-3)



W13-2



W13-3

STANDARD:

Advisory Exit Speed (W13-2) and Advisory Ramp Speed (W13-3) signs shall be vertical rectangles. The use of Advisory Exit Speed and Advisory Ramp Speed signs on freeway and expressway ramps shall be in accordance with the information shown in Table 2C-5.

GUIDANCE:

If used, the Advisory Exit Speed sign should be installed along the deceleration lane and the advisory speed displayed should be based on an engineering study. When a Truck Rollover (W1-13) sign (see Section 2C.13) is also installed for the ramp, the advisory exit speed should be based on the truck advisory speed for the horizontal alignment using recommended engineering practices.

If used, the Advisory Exit Speed sign should be visible in time for the road user to decelerate and make an exiting maneuver.

SUPPORT:

Table 2C-4 lists recommended advance sign placement distances for deceleration to various advisory speeds.

GUIDANCE:

If used, the Advisory Ramp Speed sign should be installed on the ramp to confirm the ramp advisory speed.

If used, Chevron Alignment (W1-8) signs and/or One-Direction Large Arrow (W1-6) signs should be installed on the outside of the exit curve as described in Sections 2C.9 and 2C.12.

OPTION:

Where there is a need to remind road users of the recommended advisory speed, a horizontal alignment warning sign with an advisory speed plaque may be installed at or beyond the beginning of the exit curve or on the outside of the curve, provided that it is apparent that the sign applies only to exiting traffic. These signs may also be used at intermediate points along the ramp, especially if the ramp curvature changes and the subsequent curves on the ramp have a different advisory speed than the initial ramp curve.

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SUPPORT:

Figure 2C-3 shows an example of advisory speed signing for an exit ramp. Engineering judgment should be used for actual sign selection and placement at specific locations.

2C.15 Combination Horizontal Alignment/Advisory Exit and Ramp Speed Signs (W13-6, W13-7)



OPTION:

A horizontal alignment sign (see Section 2C.7) may be combined with an Advisory Exit Speed or Advisory Ramp Speed sign to create a combination Horizontal Alignment/Advisory Exit Speed (W13-6) sign or a combination Horizontal Alignment/Advisory Ramp Speed (W13-7) sign. These combination signs may be used where the severity of the exit ramp curvature might not be apparent to road users in the deceleration lane or where the curvature needs to be specifically identified as being on the exit ramp rather than on the mainline.

2C.16 Hill Signs (W7-1, W7-1a)



GUIDANCE:

The Hill (W7-1) sign should be used in advance of a downgrade where the length, percent of grade, horizontal curvature, and/or other physical features require special precautions on the part of road users.

The Hill sign and supplemental grade (W7-3P) plaque (see Section 2C.57) used in combination, or the W7-1a sign used alone, should be installed in advance of downgrades for the following conditions:

- A. 5% grade that is more than 3,000 feet in length;
- B. 6% grade that is more than 2,000 feet in length;
- C. 7% grade that is more than 1,000 feet in length;
- D. 8% grade that is more than 750 feet in length; or
- E. 9% grade that is more than 500 feet in length.

These signs should also be installed for steeper grades or where crash experience and field observations indicate a need.

Supplemental plaques (see Section 2C.57) and larger signs should be used for emphasis or where special hill characteristics exist. On longer grades, the use of the Hill sign with a distance (W7-3aP) plaque or the combination distance/grade (W7-3bP) plaque at periodic intervals of approximately 1-mile spacing should be considered.

STANDARD:

If the percent grade is displayed on a supplemental plaque, the plaque shall be placed below the Hill (W7-1) sign.

OPTION:

A USE LOW GEAR (W7-2P) or TRUCKS USE LOWER GEAR (W7-2bP) supplemental plaque may be used to indicate a situation where downshifting as well as braking might be advisable.

2C.20 NARROW BRIDGE Sign (W5-2)



W5-2

GUIDANCE:

A NARROW BRIDGE (W5-2) sign should be used in advance of any bridge or culvert having a two-way roadway clearance width of greater than 18 feet and less than the approach roadway width, or any bridge or culvert having a roadway clearance less than the width of the approach travel lanes.

Additional emphasis should be provided by the use of object markers, delineators, and/or pavement markings.

OPTION:

A NARROW BRIDGE sign may be used in advance of a bridge or culvert on which the approach shoulders are narrowed or eliminated.

2C.21 ONE LANE BRIDGE Sign (W5-3)



W5-3

GUIDANCE:

A ONE LANE BRIDGE (W5-3) sign should be used on two-way roadways in advance of any bridge or culvert:

- A. Having a clear roadway width of less than 16 feet, or
- B. Having a clear roadway width of less than 18 feet when commercial vehicles constitute a high proportion of the traffic, or
- C. Having a clear roadway width of 18 feet or less, where the sight distance is limited on the approach to a structure.

Additional emphasis should be provided by the use of object markers, delineators, and/or pavement markings.

2C.22 Divided Highway Sign (W6-1)



W6-1

GUIDANCE:

A Divided Highway (W6-1) sign should be used on the approaches to a section of highway (not an intersection or junction) where the opposing flows of traffic are separated by a median or other physical barrier.

STANDARD:

The Divided Highway (W6-1) sign shall not be used instead of a Keep Right (R4-7 series) sign on the approach end of a median island.

2C.23 Divided Highway Ends Sign (W6-2)



W6-2

GUIDANCE:

A Divided Highway Ends (W6-2) sign should be used in advance of the end of a section of physically divided highway (not an intersection or junction) as a warning of two-way traffic ahead.

The Two-Way Traffic (W6-3) sign (see Section 2C.44) should be used to give warning and notice of the transition to a two-lane, two-way section.

2C.24 Freeway or Expressway Ends Signs (W19 Series)



W19-1



W19-2



W19-3



W19-4



W19-5

OPTION:

A FREEWAY ENDS XX MILES (W19-1) sign or a FREEWAY ENDS (W19-3) sign may be used in advance of the end of a freeway.

An EXPRESSWAY ENDS XX MILES (W19-2) sign or an EXPRESSWAY ENDS (W19-4) sign may be used in advance of the end of an expressway.

The rectangular W19-1 and W19-2 signs may be post-mounted or may be mounted overhead for increased emphasis.

GUIDANCE:

If the reason that the freeway is ending is that the next portion of the freeway is not yet constructed and as a result all traffic must use an exit ramp to leave the freeway, an ALL TRAFFIC MUST EXIT (W19-5) sign should be used in addition to the Freeway Ends signs in advance of the downstream end of the freeway.

2C.25 Double Arrow Sign (W12-1)



W12-1

OPTION:

The Double Arrow (W12-1) sign may be used to advise road users that traffic is permitted to pass on either side of an island, obstruction, or gore in the roadway. Traffic separated by this sign may either rejoin or change directions.

GUIDANCE:

If used on a raised island, the Double Arrow sign should be mounted near the approach end.

If used in front of a pier or obstruction, the Double Arrow sign should be mounted on the face of, or just in front of, the obstruction. Where stripe markings are used on the obstruction, they should be discontinued to leave a 75 mm (3 in) space around the outside of the sign.

2C.26 DEAD END/NO OUTLET Signs (W14-1, W14-1a, W14-2, W14-2a)



W14-1



W14-2



W14-1a



W14-2a

OPTION:

The DEAD END (W14-1) sign may be used at the entrance of a single road or street that terminates in a dead end or cul-de-sac. The NO OUTLET (W14-2) sign may be used at the entrance to a road or road network from which there is no other exit.

DEAD END (W14-1a) or NO OUTLET (W14-2a) signs may be used in combination with Street Name (D3-1) signs (see Section 2D.38) to warn turning traffic that the cross street ends in the direction indicated by the arrow.

At locations where the cross street does not have a name, the W14-1a or W14-2a signs may be used alone in place of a street name sign.

STANDARD:

The DEAD END (W14-1a) and NO OUTLET (W14-2a) signs shall be horizontal rectangles with an arrow pointing to the left or right.

When the W14-1 or W14-2 sign is used, the sign shall be posted as near as practical to the entry point or at a sufficient advance distance to permit the road user to avoid the dead end or no outlet condition by turning at the nearest intersecting street.

The DEAD END (W14-1a) or NO OUTLET (W14-2a) signs shall not be used instead of the W14-1 or W14-2 signs where traffic can proceed straight through the intersection into the dead end street or no outlet area.

2C.27 Low Clearance Signs (W12-2, W12-2a, W12-X2)



W12-2



W12-2a

STANDARD:

The Low Clearance (W12-2) sign shall be used to warn road users of clearances less than 12 inches above the statutory maximum vehicle height.

GUIDANCE:

The actual clearance should be displayed on the Low Clearance sign to the nearest 1 inch not exceeding the actual clearance. However, in areas that experience changes in temperature causing frost action, a reduction, not exceeding 3 inches, should be used for this condition.

Where the clearance is less than the legal maximum vehicle height, the W12-2 sign with a supplemental distance plaque should be placed at the nearest intersecting road or wide point in the road at which a vehicle can detour or turn around.



W12-X2

STANDARD:

In the case of an arch or other structure under which the clearance varies greatly, the W12-X2 Vertical Clearance sign shall be installed on the structure with the appropriate vertical clearance specified. The arrow shall indicate the location of the height specified on the sign.

GUIDANCE:

Two or more signs should be used as necessary on the structure itself to give information as to the clearances over the entire roadway. Clearances should be evaluated periodically, particularly when resurfacing operations have occurred.

OPTION:

The Low Clearance sign should be installed on and in advance of the structure. If a sign is placed on the structure, it should be a rectangular shape (W12-2a) with the appropriate legend.

2C.28 BUMP and DIP Signs (W8-1, W8-1a, W8-1b, W8-2)



W8-1



W8-1a



W8-1a
w/arrow



W8-1b



W8-2

GUIDANCE:

These signs may be supplemented with an Advisory Speed plaque (see Section 2C.8).

At the site of each severe bump or dip, a arrow may be added to the sign face (W8-1a w/arrow) to identify the exact location of the bump or dip.

A flashing beacon or orange flag may be installed on the advance sign assembly depending on the severity of the bump or dip.

At less severe or multiple bumps, a BUMP AHEAD (W8-1a) or BUMPS (W8-1b) sign may be placed in advance of the bump location. An appropriate distance plaque (W7-3a, W16-2 or W16-3) specifying the distance should be placed below the warning sign.

STANDARD:

The DIP sign shall not be used at a short stretch of depressed alignment that may momentarily hide a vehicle.

GUIDANCE:

A short stretch of depressed alignment that might momentarily hide a vehicle should be treated as a no-passing zone when centerline striping is provided on a two-lane or three-lane road (see Section 3B.2).

2C.29 SPEED HUMP Sign (W17-1)



W17-1

GUIDANCE:

The SPEED HUMP (W17-1) sign should be used to give warning of a vertical deflection in the roadway that is designed to limit the speed of traffic.

If used, the SPEED HUMP sign should be supplemented by an Advisory Speed plaque (see Section 2C.8).

OPTION:

If a series of speed humps exists in close proximity, an Advisory Speed plaque may be eliminated on all but the first SPEED HUMP sign in the series.

The legend SPEED BUMP may be used instead of the legend SPEED HUMP on the W17-1 sign.

SUPPORT:

Speed humps generally provide more gradual vertical deflection than speed bumps. Speed bumps limit the speed of traffic more severely than speed humps. Other forms of speed humps include speed tables and raised intersections. However, these differences in engineering terminology are not well known by the public, so for signing purposes these terms are interchangeable.

2C.30 PAVEMENT ENDS Sign (W8-3)



W8-3

GUIDANCE:

A PAVEMENT ENDS (W8-3) word message sign should be used where a paved surface changes to either a gravel treated surface or an earth road surface.

OPTION:

An Advisory Speed plaque (see Section 2C.8) may be used when the change in roadway condition requires a reduced speed.

2C.31 Shoulder Sign (W8-4, W8-9, W8-17, W8-23, W8-25, W5-X1)



W8-4



W8-9



W8-25



W5-X1



W8-17

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OPTION:

The SOFT SHOULDER (W8-4) sign may be used to warn of a soft shoulder condition.

The LOW SHOULDER (W8-9) sign may be used to warn of a shoulder condition where there is an elevation difference of less than 3 inches between the shoulder and the travel lane.

GUIDANCE:

The SHOULDER DROP OFF (W8-17) sign should be used where an unprotected shoulder drop-off, adjacent to the travel lane, exceeds 3 inches in depth for a significant continuous length along the roadway, based on engineering judgment.

OPTION:

A SHOULDER DROP-OFF (W8-17P) supplemental plaque may be mounted below the W8-17 sign.

The NO SHOULDER (W8-23) sign may be used to warn road users that a shoulder does not exist along a portion of the roadway.

The SHOULDER ENDS (W8-25) sign may be used to warn road users that a shoulder is ending.

STANDARD:

When used, shoulder signs shall be placed in advance of the condition (see Table 2C-4).

GUIDANCE:

Additional shoulder signs should be placed at appropriate intervals along the road where the condition continually exists.

2C.32 Surface Condition Signs (W8-5, W8-7, W8-8, W8-11, W8-13, W8-14)



OPTION:

The Slippery When Wet (W8-5) sign may be used to warn of unexpected slippery conditions. Supplemental plaques with legends such as ICE, WHEN WET, STEEL DECK, or EXCESS OIL may be used with the W8-5 sign to indicate the reason that the slippery conditions might be present.

The LOOSE GRAVEL (W8-7) sign may be used to warn of loose gravel on the roadway surface.

The ROUGH ROAD (W8-8) sign may be used to warn of a rough roadway surface.

An UNEVEN LANES (W8-11) sign may be used to warn of a difference in elevation between travel lanes.

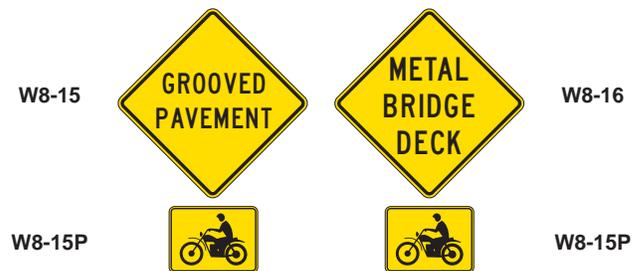
The BRIDGE ICES BEFORE ROAD (W8-13) sign may be used in advance of bridges to advise bridge users of winter weather conditions. The BRIDGE ICES BEFORE ROAD sign may be removed or covered during seasons of the year when its message is not relevant.

The FALLEN ROCKS (W8-14) sign may be used in advance of an area that is adjacent to a hillside, mountain, or cliff where rocks frequently fall onto the roadway.

GUIDANCE:

When used, Surface Condition signs should be placed in advance of the beginning of the affected section (see Table 2C-4), and additional signs should be placed at appropriate intervals along the road where the condition exists.

2C.33 Warning Signs and Plaques for Motorcyclists (W8-15, W8-15P, W8-16)



SUPPORT:

The signs and plaques described in this Section are intended to give motorcyclists advance notice of surface conditions that might adversely affect their ability to maintain control of their motorcycle under wet or dry

conditions. The use of some of the advance surface condition warning signs described in Section 2C.32, such as Slippery When Wet, LOOSE GRAVEL, or ROUGH ROAD, can also be helpful to motorcyclists if those conditions exist.

OPTION:

If a portion of a street or highway features a roadway pavement surface that is grooved or textured instead of smooth, such as a grooved skid resistance treatment for a horizontal curve or a brick pavement surface, a GROOVED PAVEMENT (W8-15) sign may be used to provide advance warning of this condition to motorcyclists, bicyclists, and other road users. Alternate legends such as TEXTURED PAVEMENT or BRICK PAVEMENT may also be used on the W8-15 sign.

If a bridge or a portion of a bridge includes a metal or grated surface, a METAL BRIDGE DECK (W8-16) sign may be used to provide advance warning of this condition to motorcyclists, bicyclists, and other road users.

A Motorcycle (W8-15P) plaque may be mounted below or above a W8-15 or W8-16 sign if the warning is intended to be directed primarily to motorcyclists.

2C.34 NO CENTER LINE Sign (W8-12)



W8-12

OPTION:

The NO CENTER LINE (W8-12) sign may be used to warn of a roadway without center line pavement markings.

2C.35 Weather Condition Signs (W8-18, W8-19, W8-21, W8-22)



W8-18

W8-19



W8-21

W8-22

OPTION:

The ROAD MAY FLOOD (W8-18) sign may be used to warn road users that a section of roadway is subject to frequent flooding. A Depth Gauge (W8-19) sign may also be installed within a roadway section that frequently floods.

STANDARD:

If used, the Depth Gauge sign shall be in addition to the ROAD MAY FLOOD sign and shall indicate the depth of the water at the deepest point on the roadway.

OPTION:

The GUSTY WINDS AREA (W8-21) sign may be used to warn road users that wind gusts frequently occur along a section of highway that are strong enough to impact the stability of trucks, recreational vehicles, and other vehicles with high centers of gravity. A NEXT XX MILES (W7-3a) supplemental plaque may be mounted below the W8-21 sign to inform road users of the length of roadway that frequently experiences strong wind gusts.

The FOG AREA (W8-22) sign may be used to warn road users that foggy conditions frequently reduce visibility along a section of highway. A NEXT XX MILES (W7-3a) supplemental plaque may be mounted below the W8-22 sign to inform road users of the length of roadway that frequently experiences foggy conditions.

**2C.36 Advance Traffic Control Signs
(W3-1, W3-2, W3-3, W3-4,
W3-X2, W3-X4)**



STANDARD:

The Advance Traffic Control signs include the Stop Ahead (W3-1), Yield Ahead (W3-2), and Signal Ahead (W3-3) signs. These signs shall be installed on an approach to a primary traffic control device that is not visible for a sufficient distance to permit the road user to respond to the device (see Table 2C-4). The visibility criteria for a traffic control signal shall be based on having a continuous view of at least two signal faces for the distance specified in Table 4D-2.

SUPPORT:

Figure 2A-4 shows the typical placement of an Advance Traffic Control sign.

Permanent obstructions causing the limited visibility might include roadway alignment or structures. Intermittent obstructions might include foliage or parked vehicles.

GUIDANCE:

Where intermittent obstructions occur, engineering judgment should determine the treatment to be implemented.

OPTION:

An Advance Traffic Control sign may be used for additional emphasis of the primary traffic control device, even when the visibility distance to the device is satisfactory.

A advance street name plaque (see Section 2C.58) may be installed above or below an Advance Traffic Control sign.

A warning beacon may be used with an Advance Traffic Control sign.

A BE PREPARED TO STOP (W3-4) sign may be used to warn of stopped traffic caused by a traffic control signal or in advance of a section of roadway that regularly experiences traffic congestion.

STANDARD:

When a BE PREPARED TO STOP sign is used in advance of a traffic control signal, it shall be used in addition to a Signal Ahead sign and shall be placed downstream from the Signal Ahead (W3-3) sign.

OPTION:

The BE PREPARED TO STOP sign may be supplemented with a warning beacon (see Section 4L.3).

STANDARD:

When the warning beacon is interconnected with a traffic control signal or queue detection system, the BE PREPARED TO STOP sign shall be supplemented with a WHEN FLASHING plaque (W3-X2) or use the PREPARE TO STOP WHEN FLASHING sign (W3-X4). See Section 4M.

SUPPORT:

Section 2C.40 contains information regarding the use of a NO MERGE AREA (W4-5P) supplemental plaque in conjunction with a Yield Ahead sign.

**2C.37 Advance Ramp Control Signal Signs
(W3-7, W3-8)**



OPTION:

A RAMP METER AHEAD (W3-7) sign may be used to warn road users that a freeway entrance ramp is metered and that they will encounter a ramp control signal (see Chapter 4I).

GUIDANCE:

When the ramp control signals are operated only during certain periods of the day, a RAMP METERED WHEN FLASHING (W3-8) sign should be installed in advance of the ramp control signal near the entrance to the ramp, or on the arterial on the approach to the ramp, to alert road users to the presence and operation of ramp meters.

STANDARD:

The RAMP METERED WHEN FLASHING sign shall be supplemented with a warning beacon (see Section 4L.3) that flashes when the ramp control signal is in operation.

2C.38 Reduced Speed Limit Ahead Signs (W3-5, W3-5a)



W3-5



W3-5a

GUIDANCE:

A Reduced Speed Limit Ahead (W3-5 or W3-5a) sign should be used to inform road users of a reduced speed zone where the speed limit is being reduced by more than 10 mph, or where engineering judgment indicates the need for advance notice to comply with the posted speed limit ahead.

STANDARD:

If used, Reduced Speed Limit Ahead signs shall be followed by a Speed Limit (R2-1) sign installed at the beginning of the zone where the speed limit applies.

The speed limit displayed on the Reduced Speed Limit Ahead sign shall be identical to the speed limit displayed on the subsequent Speed Limit sign.

2C.39 DRAW BRIDGE Sign (W3-6)



W3-6

STANDARD:

A DRAW BRIDGE (W3-6) sign shall be used in advance of movable bridge signals and gates (see Section 4J.2) to give warning to road users, except in urban conditions where such signing would not be practical.

2C.40 Merge Signs (W4-1)



W4-1

OPTION:

A Merge (W4-1) sign (see Figure 2C-8) may be used to warn road users on the major roadway that merging movements might be encountered in advance of a point where lanes from two separate roadways converge as a single traffic lane and no turning conflict occurs.

A Merge sign may also be installed on the side of the entering roadway to warn road users on the entering roadway of the merge condition.

GUIDANCE:

The Merge sign should be installed on the side of the major roadway where merging traffic will be encountered and in such a position as to not obstruct the road user's view of entering traffic.

Where two roadways of approximately equal importance converge, a Merge sign should be placed on each roadway.

When a Merge sign is to be installed on an entering roadway that curves before merging with the major roadway, such as a ramp with a curving horizontal alignment as it approaches the major roadway, the Entering Roadway Merge (W4-5) sign (see Figure 2C-8) should be used to better portray the actual geometric conditions to road users on the entering roadway.

The Merge sign should not be used where two roadways converge and merging movements are not required.

The Merge sign should not be used in place of a Lane Ends sign (see Section 2C.42) where lanes of traffic moving on a single roadway must merge because of a reduction in the actual or usable pavement width.

OPTION:

For a yield-controlled channelized right-turn movement onto a roadway without an acceleration lane, a NO MERGE AREA (W4-5P) supplemental plaque may be mounted below a Yield Ahead (W3-2) sign and/or below a YIELD (R1-2) sign when engineering judgment indicates that road users would expect an acceleration lane to be present. (see Section 2B.9 for YIELD sign applications)

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2C.41 Added Lane Sign (W4-3, W4-6)



W4-3



W4-6

GUIDANCE:

The Added Lane (W4-3) sign should be installed in advance of a point where two roadways converge and merging movements are not required. When possible, the Added Lane sign should be placed such that it is visible from both roadways; if this is not possible, an Added Lane sign should be placed on the side of each roadway.

When an Added Lane sign is to be installed on a roadway that curves before converging with another roadway that has a tangent alignment at the point of convergence, the Entering Roadway Added Lane (W4-6) sign should be used to better portray the actual geometric conditions to road users on the curving roadway.

2C.42 Lane Ends Signs

(W4-2, W9-1, W9-2)



W4-2



W9-1



W9-2

GUIDANCE:

The LANE ENDS MERGE RIGHT (LEFT) (W9-2) sign or the Lane Ends (W4-2) sign should be used to warn of the reduction in the number of traffic lanes in the direction of travel on a multi-lane highway.

OPTION:

The RIGHT (LEFT) LANE ENDS (W9-1) sign may be used in advance of the Lane Ends (W4-2) sign or the LANE ENDS MERGE LEFT (RIGHT) (W9-2) sign as additional warning or to emphasize that the traffic lane is ending and that a merging maneuver will be required.

GUIDANCE:

If used, the RIGHT (LEFT) LANE ENDS (W9-1) sign should be installed adjacent to the Lane-Reduction Arrow pavement markings.

OPTION:

On one-way streets or on divided highways where the width of the median will permit, two Lane Ends signs may be placed facing approaching traffic, one on the right-hand side and the other on the left-hand side or median.

SUPPORT:

Section 3B.9 contains information regarding the use of pavement markings in conjunction with a lane reduction.

GUIDANCE:

Where an extra lane has been provided for slower moving traffic (see Section 2B.31), a Lane Ends word sign or a Lane Ends (W4-2) symbol sign should be installed in advance of the downstream end of the extra lane.

Lane Ends signs should not be installed in advance of the downstream end of an acceleration lane.

STANDARD:

In dropped lane situations, regulatory signs (see Section 2B.20) shall be used to inform road users that a through lane is becoming a mandatory turn lane. The W4-2, W9-1, and W9-2 signs shall not be used in dropped lane situations.

2C.43 RIGHT (LEFT) LANE EXIT ONLY AHEAD Sign (W9-7)



W9-7

OPTION:

The RIGHT (LEFT) LANE EXIT ONLY AHEAD (W9-7) sign may be used to provide advance warning to road users that traffic in the right-hand (left-hand) lane of a roadway that is approaching a grade-separated interchange will be required to depart the roadway on an exit ramp at the next interchange.

STANDARD:

The W9-7 sign shall be a horizontal rectangle with a black legend and border on a yellow background.

GUIDANCE:

If used, the W9-7 sign should be installed upstream from the first overhead guide sign that contains an EXIT ONLY sign panel or upstream from the first RIGHT (LEFT) LANE MUST EXIT (R3-33) regulatory sign, whichever is farther upstream from the exit.

SUPPORT:

Section 2B.23 contains information regarding a regulatory sign that can also be used for lane drops at grade-separated interchanges.

2C.44 Two-Way Traffic Sign (W6-3)



W6-3

GUIDANCE:

A Two-Way Traffic (W6-3) sign should be used to warn road users of a transition from a multi-lane divided section of roadway to a two-lane, two-way section of roadway.

A Two-Way Traffic (W6-3) sign with an AHEAD (W16-9p) plaque should be used to warn road users of a transition from a one-way street to a two-lane, two-way section of roadway (see Figure 2B-12, Sheet 2 of 2).

OPTION:

The Two-Way Traffic sign may be used at intervals along a two-lane, two-way roadway.

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2C.45 NO PASSING ZONE Sign (W14-3)



W14-3

STANDARD:

The NO PASSING ZONE (W14-3) sign shall be a pennant-shaped isosceles triangle with its longer axis horizontal and pointing to the right. When used, the NO PASSING ZONE sign shall be installed on the left side of the roadway at the beginning of no-passing zones identified by pavement markings or DO NOT PASS signs or both (see Sections 2B.29 and 3B.2).

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2C.46 Intersection Warning Signs (W2-1 through W2-8)



W2-1



W2-2



W2-3



W2-4



W2-5



W2-7L



W2-7R



W2-8

OPTION:

A Cross Road (W2-1) symbol, Side Road (W2-2 or W2-3) symbol, T-Intersection symbol (W2-4), or Y-Intersection symbol (W2-5) sign may be used in advance of an intersection to indicate the presence of an intersection and the possibility of turning or entering traffic.

The Circular Intersection (W2-6) symbol sign may be installed in advance of a circular intersection (see Figures 2B-21 through 2B-23).

GUIDANCE:

If an approach to a roundabout has a statutory or posted speed limit of 40 mph or higher, the Circular Intersection (W2-6) symbol sign should be installed in advance of the circular intersection.



W2-6



W16-12P



W16-17P

OPTION:

A ROUNDABOUT (W16-17P) educational plaque (see Figure 2C-9) may be mounted above or below a circular intersection symbol sign on the approach to a roundabout but may not be used on an approach to a traffic circle.

A TRAFFIC CIRCLE (W16-12P) educational plaque (see Figure 2C-9) may be mounted above or below a circular intersection symbol sign on the approach to a traffic circle but may not be used on an approach to a roundabout.

The relative importance of the intersecting roadways may be shown by different widths of lines in the symbol.

An advance street name plaque (see Section 2C.49) may be installed above or below an Intersection Warning sign.

GUIDANCE:

The Intersection Warning sign should illustrate and depict the general configuration of the intersecting roadway, such as cross road, side road, T-intersection, or Y-intersection.

Intersection Warning signs, other than the Circular Intersection (W2-6) symbol sign and the T-Intersection (W2-4) symbol sign should not be used on approaches controlled by STOP signs, YIELD signs, or signals.

If an Intersection Warning sign is used where the side roads are not opposite of each other, Offset Side Roads (W2-7) symbol sign should be used instead of the Cross Road symbol sign.

If an Intersection Warning sign is used where two closely-spaced side roads are on the same side of the highway, the Double Side Roads (W2-8) symbol sign should be used instead of the Side Road symbol sign.

No more than two side road symbols should be displayed on the same side of the highway on a W2-7 or W2-8 symbol sign, and no more than three side road symbols should be displayed on a W2-7 or W2-8 symbol sign.

2C.47 Two-Direction Large Arrow Sign (W1-7)



W1-7

STANDARD:

The Two-Direction Large Arrow (W1-7) sign shall be a horizontal rectangle.

If used, it shall be installed on the far side of a T-intersection in line with, and at approximately a right angle to, traffic approaching from the stem of the T-intersection.

The Two-Direction Large Arrow sign shall not be used where there is no change in the direction of travel such as at the beginnings and ends of medians or at center piers.

The Two-Direction Large Arrow sign directing traffic to the left and right shall not be used in the central island of a roundabout.

GUIDANCE:

The Two-Direction Large Arrow sign should be visible for a sufficient distance to provide the road user with adequate time to react to the intersection configuration.

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2C.48 Traffic Signal Signs (W25-1, W25-2)



W25-1



W25-2

STANDARD:

At locations where either a W25-1 or a W25-2 sign is required based on the provisions in Section 4D.05, the W25-1 or W25-2 sign (see Figure 2C-9) shall be installed near the left-most signal head. The W25-1 and W25-2 signs shall be vertical rectangles.

2C.49 Vehicular Traffic Signs (W8-6, W11-1, W11-5, W11-5a, W11-6, W11-8, W11-10, W11-11, W11-12p, W11-14, W11-15, W11-15a, W11-15P, W11-X3,)



W8-6



W11-1



W11-1



W11-5



W11-5a



W11-6



W11-10



W11-11



W11-14



W11-8



W11-15



W11-15



W11-15a



W11-15a



W11-X3



W11-15P



W11-15P



W11-12P



W16-13P

OPTION:

Vehicular Traffic Warning (W8-6, W11-1, W11-5, W11-5a, W11-6, W11-8, W11-11, W11-12P, W11-14, W11-15, and W11-15a, W11-X3) signs may be used to alert road users to locations where unexpected entries into the roadway by trucks, bicyclists, farm vehicles, snowmobiles, emergency vehicles, golf carts, horse-drawn vehicles, or other vehicles might occur.

SUPPORT:

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

GUIDANCE:

Vehicular Traffic Warning signs should be used only at locations where the road user's sight distance is restricted, or the condition, activity, or entering traffic would be unexpected.

If the condition or activity is seasonal or temporary, the Vehicular Traffic Warning signs should be removed or covered when the condition or activity does not exist.

OPTION:

The combined Bicycle/Pedestrian (W11-15) sign may be used where both bicyclists and pedestrians might be crossing the roadway, such as at an intersection with a shared-use path. A TRAIL X-ING (W11-15P) supplemental plaque may be mounted below the W11-15 sign. The TRAIL CROSSING (W11-15a) sign may be used to warn of shared-use path crossings where pedestrians, bicyclists, and other user groups might be crossing the roadway.

The W11-1, W11-15, and W11-15a signs and their related supplemental plaques may have a fluorescent yellow-green background with a black legend and border.

Supplemental plaques (see Section 2C.53) with legends such as AHEAD, XX FEET, NEXT XX MILES, or SHARE THE ROAD may be mounted below Vehicular Traffic Warning signs to provide advance notice to road users of unexpected entries.

GUIDANCE:

If used in advance of a pedestrian and bicycle crossing, a W11-15 or W11-15a sign should be supplemented with an AHEAD or XX FEET plaque to inform road users that they are approaching a point where crossing activity might occur.

STANDARD:

If a post-mounted W11-1, W11-6, W11-11, W11-15, or W11-15a sign is placed at the location of the crossing point where golf carts, pedestrians, bicyclists, or other shared-use path users might be crossing the roadway, a diagonal downward pointing arrow (W16-7P) plaque shall be mounted below the sign. If the W11-1, W11-6, W11-11, W11-15, or W11-15a sign is mounted overhead, the W16-7P supplemental plaque shall not be used.

OPTION:

The crossing location identified by a W11-1, W11-6, W11-11, W11-15, or W11-15a sign may be defined with crosswalk markings (see Section 3B.18).

STANDARD:

The Emergency Vehicle (W11-8) sign with the EMERGENCY SIGNAL AHEAD (W11-12P) supplemental plaque shall be placed in advance of all emergency-vehicle traffic control signals (see Chapter 4F).

OPTION:

The Emergency Vehicle (W11-8) sign, or a word message sign indicating the type of emergency vehicle (such as rescue squad), may be used in advance of the emergency vehicle station when no emergency-vehicle traffic control signal is present.

A Warning Beacon (see Section 4L.3) may be used with any Vehicular Traffic Warning sign to indicate specific periods when the condition or activity is present or is likely to be present, or to provide enhanced sign conspicuity.

A supplemental WHEN FLASHING (W16-13P) plaque may be used with any Vehicular Traffic Warning sign that is supplemented with a Warning Beacon to indicate specific periods when the condition or activity is present or is likely to be present.

**2C.50 Non-Vehicular Signs
(W11-2, W11-3, W11-4, W11-7,
W11-9, W11-16 through W11-22)**



W11-2



W11-2



W11-3



W11-4



W11-7



W11-9



W11-9



W11-16



W11-17



W11-18



W11-19



W11-20



W11-21



W11-22

OPTION:

Non-Vehicular Warning (W11-2, W11-3, W11-4, W11-7, W11-9, and W11-16 through W11-22) signs may be used to alert road users in advance of locations where unexpected entries into the roadway might occur or where shared use of the roadway by pedestrians, animals, or equestrians might occur.

SUPPORT:

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

GUIDANCE:

If used in advance of a pedestrian, snowmobile, or equestrian crossing, the W11-2, W11-7, and W11-9 signs should be supplemented with plaques (see Section 2C.55) with the legend AHEAD or XX FEET to inform road users that they are approaching a point where crossing activity might occur.



STANDARD:

If a post-mounted W11-2, W11-6, W11-7, or W11-9 sign is placed at the location of the crossing point where pedestrians, snowmobilers, or equestrians might be crossing the roadway, a diagonal downward pointing arrow (W16-7P) plaque shall be mounted below the sign. If the W11-2, W11-7, or W11-9 sign is mounted overhead, the W16-7P plaque shall not be used.

OPTION:

A Pedestrian Crossing (W11-2) sign may be placed overhead or may be post-mounted with a diagonal downward pointing arrow (W16-7P) plaque at the crosswalk location where Yield Here To (Stop Here For) Pedestrians signs (see Section 2B.11) have been installed in advance of the crosswalk.

STANDARD:

If a W11-2 sign has been post-mounted at the crosswalk location where a Yield Here To (Stop Here For) Pedestrians sign is used on the approach, the Yield Here To (Stop Here For) Pedestrians sign shall not be placed on the same post as or block the road user's view of the W11-2 sign.

OPTION:

An advance Pedestrian Crossing (W11-2) sign with an AHEAD or a distance supplemental plaque may be used in conjunction with a Yield Here To (Stop Here For) Pedestrians sign on the approach to the same crosswalk.

The crossing location identified by a W11-2, W11-7, or W11-9 sign may be defined with crosswalk markings (see Section 3B.18).

The W11-2 and W11-9 signs and their related supplemental plaques may have a fluorescent yellow-green background with a black legend and border.

Pedestrian and School Crossing signs and their related supplemental plaques may have a fluorescent yellow-green background with a black legend and border.

GUIDANCE:

When a fluorescent yellow-green background is used, a systematic approach featuring one background color within a zone or area should be used. The mixing of standard yellow and fluorescent yellow-green backgrounds within a selected site area should be avoided.

Non-vehicular signs should be used only at locations where the crossing activity is unexpected or at locations not readily apparent.

Additional information on crossings can be found in the following sections:

- Section 7B School Crossing sign
- Section 9B Bicycle Crossing sign
- Appendix B Handicapped Signing and Pavement Marking for Senior Citizens and Disabled Persons

OPTION:

A Warning Beacon (see Section 4L.3) may be used with any Non-Vehicular Warning sign to indicate specific periods when the condition or activity is present or is likely to be present, or to provide enhanced sign conspicuity.

A supplemental WHEN FLASHING (W16-13P) plaque may be used with any Non-Vehicular Warning sign that is supplemented with a Warning Beacon to indicate specific periods when the condition or activity is present or is likely to be present.

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If two street names are used on the Advance Street Name plaque, a directional arrow pointing in the direction of the street shall be placed next to each street name. Arrows pointing to the left shall be placed to the left of the street name, and arrows pointing to the right shall be placed to the right of the street name.

GUIDANCE:

If two street names are used on the Advance Street Name plaque, the street names and associated arrows should be displayed in the following order:

- A. For a single intersection, the name of the street to the left should be displayed above the name of the street to the right; or
- B. For two sequential intersections, such as where the plaque is used with an Offset Side Roads (W2-7) or a Double Side Road (W2-8) symbol sign, the name of the first street encountered should be displayed above the name of the second street encountered, and the arrow associated with the second street encountered should be an advance arrow, such as the arrow shown on the W16-6P arrow plaque.

2C.59 CROSS TRAFFIC DOES NOT STOP Plaque (W4-4P Series)



OPTION:

The CROSS TRAFFIC DOES NOT STOP (W4-4P) plaque (see Figure 2C-9) may be used in combination with a STOP sign when engineering judgment indicates that conditions are present that are causing or could cause drivers to misinterpret the intersection as an all-way stop.

Alternate messages such as TRAFFIC FROM LEFT (RIGHT) DOES NOT STOP (W4-4aP) or ONCOMING TRAFFIC DOES NOT STOP (W4-4bP) may be used when such messages more accurately describe the traffic controls established at the intersection.

GUIDANCE:

Plaques with the appropriate alternative messages of TRAFFIC FROM LEFT (RIGHT) DOES NOT STOP or ONCOMING TRAFFIC DOES NOT STOP should be used at intersections where STOP signs control all but one approach to the intersection, unless the only non-stopped approach is from a one-way street.

STANDARD:

If a W4-4P plaque or a plaque with an alternative message is used, it shall be mounted below the STOP sign.

OPTION:

A double-headed arrow may be included within the plaque (W4-4P) except at one-way crossings.

STANDARD:

A single headed arrow shall not be used.

2C.60 SHARE THE ROAD Plaque (W16-1P)



W16-1P

OPTION:

In situations where there is a need to warn drivers to watch for other slower forms of transportation traveling along the highway, such as bicycles, golf carts, horse-drawn vehicles, or farm machinery, a SHARE THE ROAD (W16-1P) plaque may be used.

STANDARD:

A W16-1P plaque shall not be used alone. If a W16-1P plaque is used, it shall be mounted below either a Vehicular Traffic Warning sign (see Section 2C.49) or a Non-Vehicular Warning sign (see Section 2C.50). The background color of the W16-1P plaque shall match the background color of the warning sign with which it is displayed.

2C.61 PHOTO ENFORCED Plaque (W16-10P, W16-10aP)



OPTION:

A Photo Enforced (W16-10P) plaque or a PHOTO ENFORCED (W16-10aP) word message plaque may be mounted below a warning sign to advise road users that the regulations associated with the condition being warned about (such as a traffic control signal or a toll plaza) are being enforced by photographic equipment.

STANDARD:

If used below a warning sign, the Photo Enforced (W16-10P or W16-10aP) plaque shall be a rectangle with a black legend and border on a yellow background.

2C.62 NEW Plaque (W16-15P)



W16-15P

OPTION:

A NEW (W16-15P) plaque may be mounted above a regulatory sign when a new regulation takes effect in order to alert road users to the new traffic regulation. A NEW plaque may also be mounted above an advance warning sign (such as a Signal Ahead sign for a newly-installed traffic control signal) for a new traffic regulation.

STANDARD:

The NEW plaque shall not be used alone.

The NEW plaque shall be removed no later than 6 months after the regulation has been in effect.

2C.63 Object Marker Design and Placement Height

SUPPORT:

Type 1, 2, and 3 object markers are used to mark obstructions within or adjacent to the roadway. Type 4 object markers are used to mark the end of a roadway.

STANDARD:

When used, object markers shall not have a border and shall consist of an arrangement of one or more of the following types:

Type 1-a diamond-shaped sign, at least 18 inches on a side, consisting of either a yellow (OM1-1) or black (OM1-2) sign with nine yellow retroreflective devices, each with a minimum diameter of 3 inches, mounted symmetrically on the sign, or an all-yellow retroreflective sign (OM1-3).

Type 2-either a marker (OM2-1V or OM2-1H) consisting of three yellow retroreflective devices, each with a minimum diameter of 3 inches, arranged either horizontally or vertically on a white sign measuring at least 6 x 12 inches; or an all-yellow horizontal or vertical retroreflective sign (OM2-2V or OM2-2H), measuring at least 6 x 12 inches.

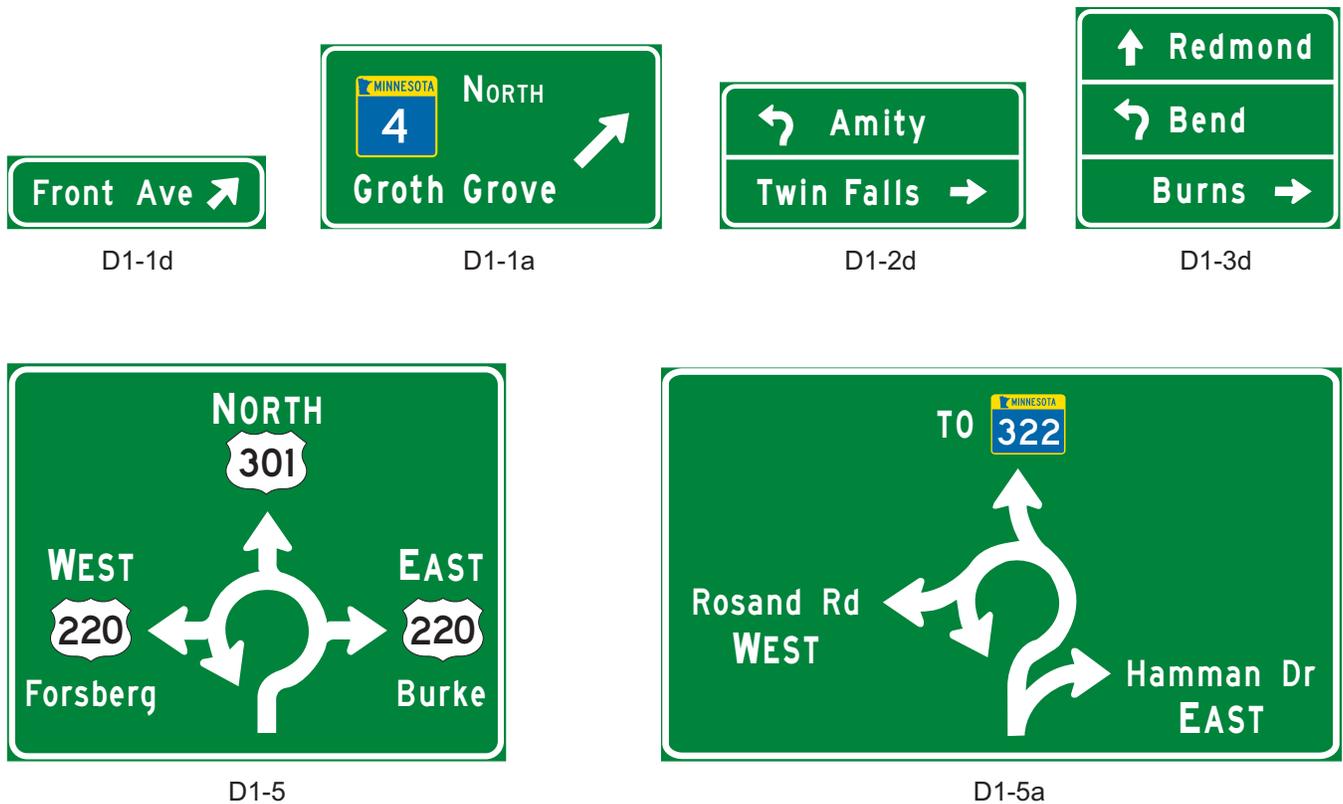
Type 3-a striped marker, 12 x 36 inches, consisting of a vertical rectangle with alternating black and retroreflective yellow stripes sloping downward at an angle of 45 degrees toward the side of the obstruction on which traffic is to pass. The minimum width of the yellow and black stripes shall be 3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

Type 4-a diamond-shaped sign, at least 18 inches on a side, consisting of either a red (OM4-1) or black (OM4-2) sign with nine red retroreflective devices, each with a minimum diameter of 3 inches, mounted symmetrically on the sign, or an all-red retroreflective sign (OM4-3).

SUPPORT:

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

Type 3 object markers with stripes that begin at the upper right side and slope downward to the lower left side are designated as right object markers (OM3-R). Object markers with stripes that begin at the upper left side and slope downward to the lower right side are designated as left object markers (OM3-L).



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Figure 2D-8. Destination Signs for Roundabouts

intersection is non-typical, such as where more than four legs are present or where the legs are not at approximately 90-degree angles to each other.

STANDARD:

If used, diagrammatic guide signs for circular intersections shall not depict the number of lanes within the intersection circulatory roadway, or on its approaches or exits, through the use of lane lines, multiple arrow shafts for the same movement, or other methods.

SUPPORT:

Chapter 2B contains information regarding regulatory signs at circular intersections, Chapter 2C contains information regarding warning signs at circular intersections, and Chapter 3C contains information regarding pavement markings at circular intersections.

2D.39 Destination Signs at Jughandles

STANDARD:

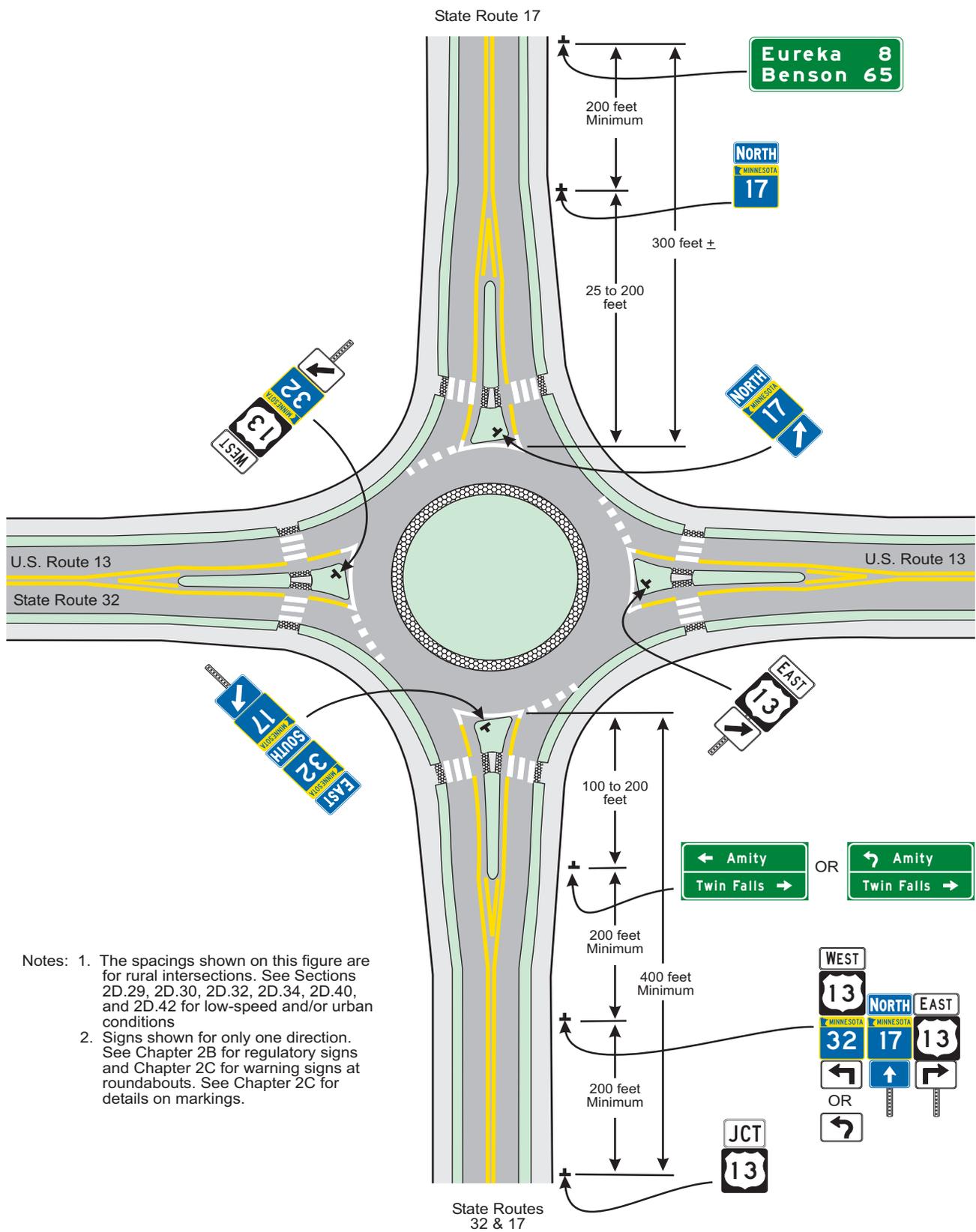
Destination signs that are used at jughandles shall comply with the provisions of Section 2D.37, except as provided in this Section.

OPTION:

If engineering judgment indicates that standard destination signs alone are insufficient to direct road users to their destinations at a jughandle, a diagrammatic guide sign depicting the appropriate geometry may be used to supplement the normal destination signs.

SUPPORT:

Section 2B.27 contains information regarding regulatory signs for jughandle turns. Figure 2B-9 shows examples of regulatory and destination guide signing for various types of jughandle turns.



- Notes: 1. The spacings shown on this figure are for rural intersections. See Sections 2D.29, 2D.30, 2D.32, 2D.34, 2D.40, and 2D.42 for low-speed and/or urban conditions
2. Signs shown for only one direction. See Chapter 2B for regulatory signs and Chapter 2C for warning signs at roundabouts. See Chapter 2C for details on markings.

Figure 2D-9. Examples of Guide Signs for Roundabouts (Sheet 1 of 2)

Type of Mounting	Type of Street or Highway	Speed Limit	Recommended Minimum Letter Height	
			Initial Upper-Case	Lower-Case
Overhead	All types	All speed limits	12 inches	9 inches
Post-Mounted	Multi-lane	More than 40 mph	8 inches	6 inches
Post Mounted	Multi-lane	40 mph or less	6 inches	4.5 inches
Post-Mounted	2-lane	All speed limits	6 inches*	4.5 inches*

* On local two-lane streets with speed limits of 25 mph or less, 4-inch initial upper-case letters with 3-inch lower-case letters may be used.

Table 2D-2. Recommended Minimum Letter Heights on Street Name Signs

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

GUIDANCE:

Street Name (D3-1 or D3-1a) signs should be installed in urban areas at all street intersections regardless of other route signs that might be present and should be installed in rural areas to identify important roads that are not otherwise

OPTION:

For streets that are part of a U.S., State, or county numbered route, a D3-1a Street Name sign that incorporates a route shield may be used to assist road users who might not otherwise be able to associate the name of the street with the route number.

STANDARD:

The lettering for names of streets and highways on Street Name signs shall be composed of a combination of lower-case letters with initial upper-case letters (see Section 2A.13).

GUIDANCE:

Lettering on post-mounted Street Name signs should be composed of initial upper-case letters at least 6 inches in height and lower-case letters at least 4.5 inches in height.

On multi-lane streets with speed limits greater than 40 mph, the lettering on post-mounted Street Name signs should be composed of initial upper-case letters at least 8 inches in height and lower-case letters at least 6 inches in height.



D3-1a



D3-1a

OPTION:

For local roads with speed limits of 25 mph or less, the lettering on post-mounted Street Name signs may be composed of initial upper-case letters at least 4 inches in height and lower-case letters at least 3 inches in height.

GUIDANCE:

If overhead Street Name signs are used, the lettering should be composed of initial upper-case letters at least 12 inches in height and lower-case letters at least 9 inches in height.

SUPPORT:

The recommended minimum letter heights for Street Name signs are summarized in Table 2D-2.

OPTION:

Supplementary lettering to indicate the type of street (such as Street, Avenue, or Road) or the section of the city (such as NW) on the D3-1 and D3-1a signs may be in smaller lettering, composed of initial upper-case letters at least 3 inches in height and lower-case letters at least 2.25 inches in height. Conventional abbreviations (see Section 1A.15) may be used except for the street name itself.

A pictograph (see definition in Section 1A.13) may be used on a D3-1 sign.

STANDARD:

Pictographs shall not be displayed on D3-1a or Advance Street Name (D3-2) signs (see Section 2D.44).

If a pictograph is used on a D3-1 sign, the height and width of the pictograph shall not exceed the upper-case letter height of the principal legend of the sign.

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GUIDANCE:

The pictograph should be positioned to the left of the street name.

STANDARD:

The Street Name sign shall be retroreflective or illuminated to show the same shape and similar color both day and night. The color of the legend (and border, if used) shall contrast with the background color of the sign.

OPTION:

The border may be omitted from a Street Name sign.

An alternative background color other than the normal guide sign color of green may be used for Street Name (D3-1 or D3-1a) signs where the highway agency determines this is necessary to assist road users in determining jurisdictional authority for roads.

STANDARD:

Alternative background colors shall not be used for Advance Street Name (D3-2) signs (see Section 2D.44).

The only acceptable alternative background colors for Street Name (D3-1 or D3-1a) signs shall be blue, brown, or white. Regardless of whether green, blue, or brown is used as the background color for Street Name (D3-1 or D3-1a) signs, the legend (and border, if used) shall be white. For Street Name signs that use a white background, the legend (and border, if used) shall be black.

GUIDANCE:

An alternative background color for Street Name signs, if used, should be applied to the Street Name (D3-1 or D3-1a) signs on all roadways under the jurisdiction of a particular highway agency.

In business or commercial areas and on principal arterials, Street Name signs should be placed at least on diagonally opposite corners. In residential areas, at least one Street Name sign should be mounted at each intersection. Signs naming both streets should be installed at each intersection. They should be mounted with their faces parallel to the streets they name.

OPTION:

To optimize visibility, Street Name signs may be mounted overhead. Street Name signs may also be placed above a regulatory or STOP or YIELD sign with no required vertical separation.

GUIDANCE:

In urban or suburban areas, especially where Advance

Street Name signs for signalized and other major intersections are not used, the use of overhead Street Name signs should be strongly considered.

OPTION:

At intersection crossroads where the same road has two different street names for each direction of travel, both street names may be displayed on the same sign along with directional arrows.

On lower speed roadways, historic street name signs within locally identified historic districts that are consistent with the criteria contained in 36 CFR 60.4 for such structures and districts may be used without complying with the provisions of the 1st Standard; 2nd Guidance, 1st paragraph; 2nd Option; 3rd Option, 1st paragraph; 2nd Standard, 2nd paragraph; 4th Guidance; 3rd Standard; 4th Standard, 2nd paragraph; and 5th Guidance of this section.

SUPPORT:

Information regarding the use of street names on supplemental plaques for use with intersection-related warning signs is contained in Section 2C.58.

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2D.44 Advance Street Name Sign (D3-2)

SUPPORT:

Advance Street Name (D3-2) signs identify an upcoming intersection. Although this is often the next intersection, it could also be several intersections away in cases where the next signalized intersection is referenced.

STANDARD:

Advance Street Name (D3-2) signs, if used, shall supplement rather than be used instead of the Street Name (D3-1) signs at the intersection.



OPTION:

Advance Street Name (D3-2) signs may be installed in advance of signalized or unsignalized intersections to provide road users with advance information to identify the name(s) of the next intersecting street to prepare for crossing traffic and to facilitate timely deceleration and/or lane changing in preparation for a turn.

GUIDANCE:

On arterial highways in rural areas, Advance Street Name signs should be used in advance of all signalized intersections and in advance of all intersections with exclusive turn lanes.

In urban areas, Advance Street Name signs should be used in advance of all signalized intersections on major arterial streets, except where signalized intersections are so closely spaced that advance placement of the signs is impractical.

The heights of the letters on Advance Street Name signs should be the same as those used for Street Name signs (see Section 2D.43).

STANDARD:

If used, Advance Street Name signs shall have a white legend and border on a green background.

If used, Advance Street Name signs shall provide the name(s) of the intersecting street(s) on the top line(s) of the legend and the distance to the intersecting streets or messages such as NEXT SIGNAL, NEXT INTERSECTION, NEXT ROUNDABOUT, or directional arrow(s) on the bottom line of the legend.

Pictographs shall not be displayed on Advance Street Name signs.

OPTION:

Directional arrow(s) may be placed to the right or left of the street name or message such as NEXT SIGNAL, as appropriate, rather than on the bottom line of the legend. Curved-stem arrows may be used on Advance Street Name signs on approaches to circular intersections.

For intersecting crossroads where the same road has a different street name for each direction of travel, the different street names may be displayed on the same Advance Street Name sign along with directional arrows.

In advance of two closely-spaced intersections where it is not practical to install separate Advance Street Name signs, the Advance Street Name sign may include the street names for both intersections along with appropriate supplemental legends for both street names, such as NEXT INTERSECTION, 2ND INTERSECTION, or NEXT LEFT and NEXT RIGHT, or directional arrows.

GUIDANCE:

If two street names are used on the Advance Street Name sign, the street names should be displayed in the following order:

- A. For a single intersection where the same road has a different street name for each direction of travel, the name of the street to the left should be displayed above the name of the street to the right; or
- B. for two closely-spaced intersections, the name of the first street encountered should be displayed above the name of the second street encountered, and the arrow associated with the second street encountered should be an advance arrow, such as the arrow shown on the W16-6P arrow plaque (see Figure 2C-12).

OPTION:

An Advance Street Name (W16-8P or W16-8aP) plaque (see Section 2C.58) with black legend on a yellow background, installed supplemental to an Intersection (W2 series) or Advance Traffic Control (W3 series) warning sign may be used instead of an Advance Street Name guide sign.

2D.45 Signing on Conventional Roads on Approaches to Interchanges

SUPPORT:

Because there are a number of different ramp configurations that are commonly used at interchanges with conventional roads, drivers on the conventional road cannot reliably predict whether they will be required to turn left or right in order to enter the correct ramp to access the freeway or expressway in the desired direction of travel. Consistently applied signing for conventional road approaches to freeway or expressway interchanges is highly desirable.

STANDARD:

On multi-lane conventional roads approaching an interchange, guide signs shall be provided to identify which direction of turn is to be made and/or which specific lane to use for ramp access to each direction of the freeway or expressway.

GUIDANCE:

The signing of conventional roads with one lane of traffic approaching an interchange should consist of a sequence containing the following signs (see Figure 2D-11):

- A. Junction Assembly
- B. Destination sign
- C. Directional Assembly or Entrance Direction sign for the first ramp
- D. Advance Route Turn Assembly or Advance Entrance Direction sign with an advance turn arrow
- E. Directional Assembly or Entrance Direction sign for the second ramp

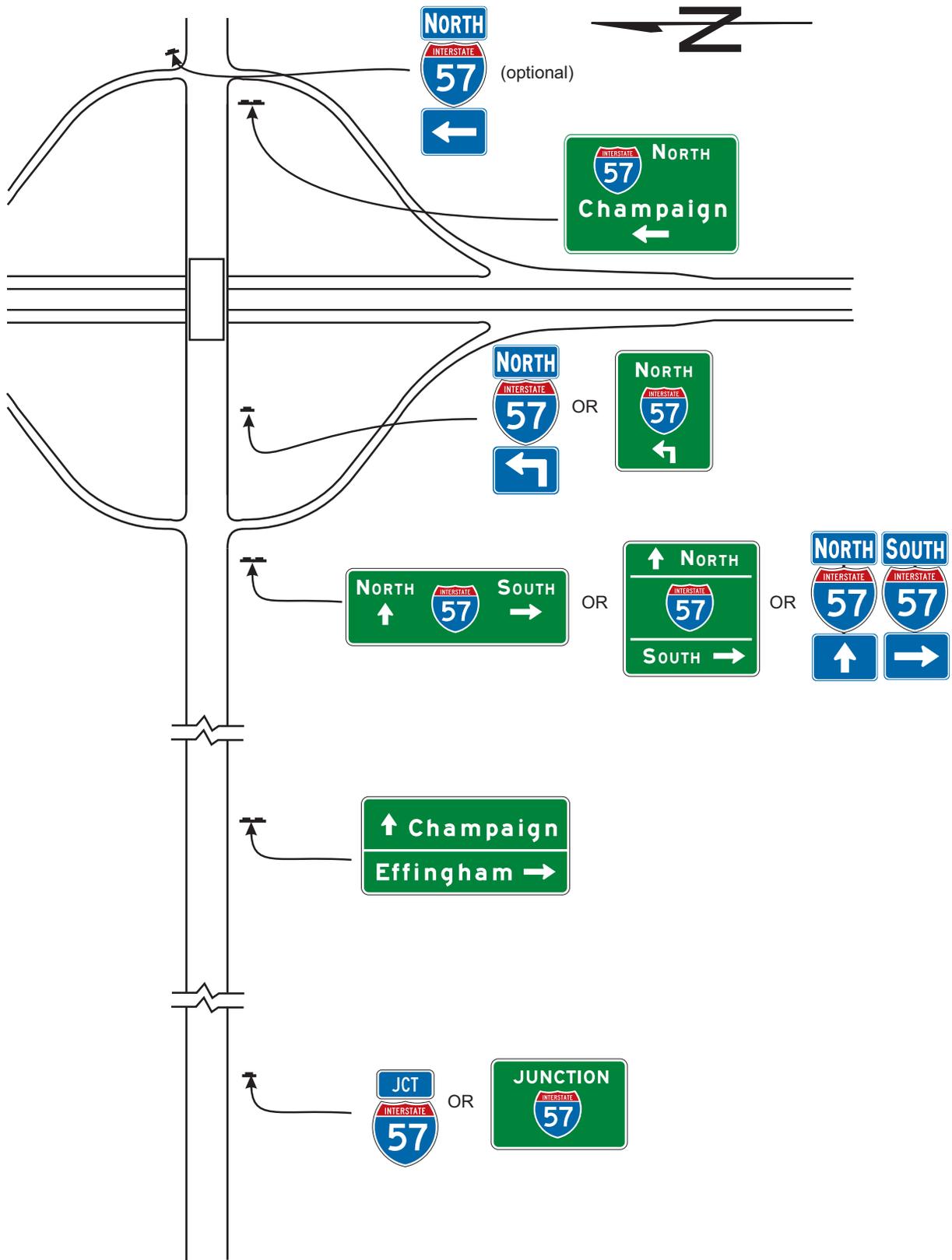


Figure 2D-11. Example of Interchange Crossroad Signing for a One-Lane Approach

2E.13 Designation of Destinations

STANDARD:

The direction of a freeway and the major destinations or control cities along it shall be clearly identified through the use of appropriate destination legends (see Section 2D.37). Successive freeway guide signs shall provide continuity in destination names and consistency with available map information. At any decision point, a given destination shall be indicated by way of only one route.

GUIDANCE:

Control city legends should be used in the following situations along a freeway:

- A. At interchanges between freeways;
- B. At separation points of overlapping freeway routes;
- C. On directional signs on intersecting routes, to guide traffic entering the freeway;
- D. On Pull-Through signs;
- E. On the bottom line of post-interchange distance signs.

SUPPORT:

Continuity of destination names is also useful on expressways serving long-distance or intrastate travel.

The determination of major destinations or control cities is important to the quality of service provided by the freeway. Control cities on freeway guide signs are selected by the States and are contained in the "Guidelines for the Selection of Supplemental Guide Signs for Traffic Generators Adjacent to Freeways, 4th Edition/Guide Signs, Part II: Guidelines for Airport Guide Signing/Guide Signs, Part III: List of Control Cities for Use in Guide Signs on Interstate Highways," published by and available from the American Association of State and Highway Transportation Officials (see Section 1A.11).

2E.14 Size and Style of Letters and Signs

STANDARD:

Except as provided in Section 2A.11, the sizes of freeway and expressway guide signs that have standardized designs shall be as shown in Table 2E-1.

SUPPORT:

Section 2A.11 contains information regarding the applicability of the various columns in Table 2E-1.

OPTION:

Signs larger than those shown in Table 2E-1 may be used (see Section 2A.11).

STANDARD:

For all freeway and expressway signs that do not have a standardized design, the message dimensions shall be determined first, and the outside sign dimensions secondarily. Word messages in the legend of expressway guide signs shall be in letters at least 8 inches high. Larger lettering shall be used for major guide signs at or in advance of interchanges and for all overhead signs. Minimum numeral and letter sizes for expressway guide signs according to interchange classification, type of sign, and component of sign legend shall be as shown in Tables 2E-2 and 2E-3. Minimum numeral and letter sizes for freeway guide signs according to interchange classification, type of sign, and component of sign legend shall be as shown in Tables 2E-4 and 2E-5. All names of places, streets, and highways on freeway and expressway guide signs shall be composed of lower-case letters with initial upper-case letters. The letters and the numerals used shall be Series E(M) of the FHWA "Standard Highway Signs and Markings" book (see Section 1A.11). The nominal loop height of the lower-case letters shall be 3/4 of the height of the initial upper-case letter (see Paragraph 2 of Section 2D.5 for additional information on the specification of letter heights). Other word legends shall be composed of upper-case letters. Interline and edge spacing shall be as provided in Section 2E.15.

Lettering size on freeway and expressway signs shall be the same for both rural and urban conditions.

SUPPORT:

Sign size is determined primarily in terms of the length of the message and the size of the lettering necessary for proper legibility. Letter style and height, and arrow design have been standardized for freeway and expressway signs to assure uniform and effective application.

Designs for upper-case and lower-case alphabets together with tables of recommended letter spacing, are shown in the FHWA "Standard Highway Signs and Markings" book and the Mn/DOT "Standard Signs Manual".

GUIDANCE:

Freeway lettering sizes (see Tables 2E-4 and 2E-5) should be used when expressway geometric design is comparable to freeway standards.

Other sign letter size requirements not specifically identified elsewhere in this Manual should be guided by these specifications. Abbreviations (see Section 2E.17) should be kept to a minimum.

Sign or Plaque	Sign Designation	Section	Minimum Size
Exit Number (plaque)			
1-,2-Digit Exit Number	E1-5P	2E.31	114 x 30
3-Digit Exit Number	E1-5P	2E.31	132 x 30
1-,2-Digit Exit Number (with single letter suffix)	E1-5P	2E.31	138 x 30
3-Digit Exit Number (with single letter suffix)	E1-5P	2E.31	156 x 30
1-,2-Digit Exit Number (with dual letter suffix)	E1-5P	2E.31	168 x 30
3-Digit Exit Number (with dual letter suffix)	E1-5P	2E.31	186 x 30
Left (plaque)	E1-5aP	2E.33	72 x 30
Left Exit Number (plaque)			
1-,2-Digit Exit Number	E1-5bP	2E.31	114 x 54
3-Digit Exit Number	E1-5bP	2E.31	132 x 54
1-,2-Digit Exit Number (with single letter suffix)	E1-5bP	2E.31	136 x 54
3-Digit Exit Number (with single letter suffix)	E1-5bP	2E.31	156 x 54
1-,2-Digit Exit Number (with dual letter suffix)	E1-5bP	2E.31	168 x 54
3-Digit Exit Number (with dual letter suffix)	E1-5bP	2E.31	186 x 54
Next Exit XX Miles (1 Line)	--	2E.34	Varies x 24
Next Exit XX Miles (2 Lines)	--	2E.34	Varies x 36
Exit Gore (no exit number)	E5-1	2E.37	72 x 60
Exit Gore (with exit number)			
1-,2-Digit Exit Number	E5-1a	2E.37	78 x 60
3-Digit Exit Number	E5-1a	2E.37	96 x 60
1-Digit Exit Number (with single letter suffix)	E5-1a	2E.37	90 x 60
2-Digit Exit Number (with single letter suffix)	E5-1a	2E.37	108 x 60
3-Digit Exit Number (with single letter suffix)	E5-1a	2E.37	126 x 60
1-,2-Digit Exit Number (with dual letter suffix)	E5-1a	2E.37	120 x 60
2-Digit Exit Number (with dual letter suffix)	E5-1a	2E.37	138 x 60
3-Digit Exit Number (with dual letter suffix)	E5-1a	2E.37	156 x 60
Exit Number (plaque)			
1-,2-Digit Exit Number	E5-1bP	2E.37	42 x 30
3-Digit Exit Number	E5-1bP	2E.37	60 x 30
1-Digit Exit Number (with single letter suffix)	E5-1bP	2E.37	48 x 30
1-Digit Exit Number (with dual letter suffix)	E5-1bP	2E.37	72 x 30
2-Digit Exit Number (with single or dual letter suffix)	E5-1bP	2E.37	72 x 30
3-Digit Exit Number (with single or dual letter suffix)	E5-1bP	2E.37	72 x 30
Narrow Exit Gore	E5-1c	2E.37	60 x 90 *
Pull-Through	E6-2	2E.12	Varies x 120 *
Pull-Through	E6-2a	2E.12	Varies x 90 *
Exit Only (with arrow)	E11-1, 1d	2E.24	174 ** x 36
Exit	E11-1a	2E.24	66 x 18
Only	E11-1b	2E.24	66 x 18
Exit Only	E11-1c	2E.24	120 x 18
Exit Only (with two arrows)	E11-1e, 1f	2E.24	222 ** x 36
Left	E11-2	2E.40	60 x 18
Exit Gore Advisory Speed (plaque)	E13-1P	2E.37	72 x 24
Exit Direction Advisory Speed	E13-2	2E.36	162 x 24
Interstate Route Sign (1 or 2 digits)	M1-1	2E.27	36 x 36
Interstate Route Sign (3 digits)	M1-1	2E.27	45 x 36
Off-Interstate Route Sign (1 or 2 digits)	M1-2, 3	2E.27	36 x 36
Off-Interstate Route Sign (3 digits)	M1-2, 3	2E.27	45 x 36
U.S. Route Sign (1 or 2 digits)	M1-4	2E.27	36 x 36
U.S. Route Sign (3 digits)	M1-4	2E.27	45 x 36
State Route Sign (1 or 2 digits)	M1-5b	2D.11	36 x 36

Table 2E-1 Freeway or Expressway Guide Sign and Plaque Sizes

(Sheet 1 of 2)

Interchange exit numbering shall use the reference location sign exit numbering method. The consecutive exit numbering method shall not be used.

SUPPORT:

Reference location sign exit numbering assists road users in determining their destination distances and travel mileage, and assists highway agencies because the exit numbering sequence does not have to be changed if new interchanges are added to a route.

OPTION:

Exit numbers may also be used with Supplemental Guide signs and Motorist Service signs.

GUIDANCE:

Exit number (E1-5P) plaques should be added to the top right-hand edge of the sign for an exit to the right.

STANDARD:

Because road users might not expect an exit to the left and might have difficulty in maneuvering to the left, a left exit number (E1-5bP) plaque (see Figure 2E-22) shall be added to the top left-hand edge of the sign for all left-hand exits (see Figures 2E-14 and 2E-15). The word LEFT on the E1-5bP plaque shall be a black legend on a yellow rectangular sign panel and shall be centered above the word EXIT.

Compliance Date: December 31, 2014

SUPPORT:

Example exit number plaque designs are shown in Figure 2E-22. Figures 2E-3, 2E-7, 2E-22, 2E-26, and 2E-27 illustrate the incorporation of exit number plaques on guide signs.

The general plan for numbering interchange exits is shown in Figures 2E-19 through 2E-21. Figure 2E-19 shows a circumferential route, which is a route that makes a complete circle around a city or town and usually has two interchanges (one on each side of the city or town) with each of the mainline routes that travel through the city or town. Figure 2E-20 shows a loop route, which is a route that departs from a mainline route and then rejoins the same mainline route at a subsequent point downstream, and a spur route, which is a route that departs from a mainline route and never rejoins the same mainline route. Figure 2E-21 shows two mainline routes that overlap each other.

STANDARD:

Regardless of whether a mainline route originates within a State or crosses into a State from another State, the southernmost or westernmost terminus within that State shall be the beginning point for interchange numbering.

For circumferential routes, interchange numbering shall be in a clockwise direction. The numbering shall begin with the first interchange west of the south end of an imaginary north-south line bisecting the circumferential route, at a radial freeway or other Interstate route, or some other conspicuous landmark in the circumferential route near a south polar location (see Figure 2E-19).

The interchange numbers on loop routes shall begin at the loop interchange nearest the south or west mainline junction and increase in magnitude toward the north or east mainline junction (see Figure 2E-20).

Spur route interchanges shall be numbered in ascending order starting at the interchange where the spur leaves the mainline route (see Figure 2E-20).

If a circumferential, loop, or spur route crosses State boundaries, the numbering sequence shall be coordinated by the States to provide continuous interchange numbering.

Where numbered routes overlap, continuity of interchange numbering shall be established for only one of the routes (see Figure 2E-21). If one of the routes is an Interstate and the other route is not an Interstate, the Interstate route shall maintain continuity of interchange numbering.

GUIDANCE:

The route chosen for continuity of interchange numbering should also have reference location sign continuity (see Figure 2E-21).

2E.32 Interchange Classification

SUPPORT:

For signing purposes, interchanges are classified as major, intermediate, and minor. The minimum alphabet sizes contained in Tables 2E-2 and 2E-4 are based on this classification. Descriptions of these classifications are as follows:

- A. Major interchanges are subdivided into two categories: (a) interchanges with other expressways or freeways, or (b) interchanges with high-volume multi-lane highways, principal urban arterials, and major rural routes where the volume of interchanging traffic is heavy or includes many road users unfamiliar with the area.
- B. Intermediate interchanges are those with urban and rural routes not in the category of major or minor interchanges.
- C. Minor interchanges include those where traffic is local and very light, such as interchanges with land service access roads. Where the sum of exit volumes is estimated to be lower than 100 vehicles per day in the design year, the interchange is classified as minor.

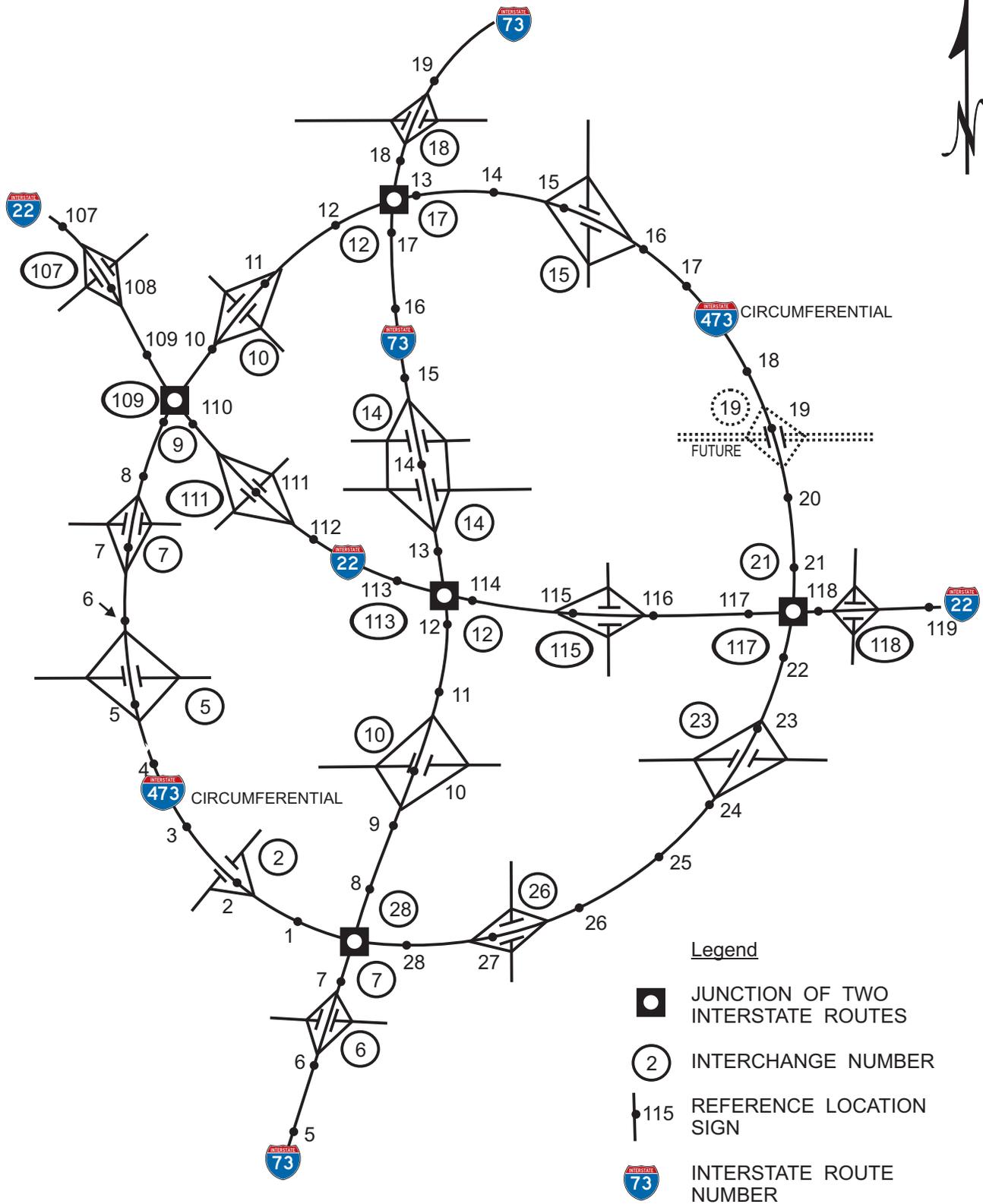


Figure 2E-19. Example of Interchange Numbering for Mainline and Circumferential Routes



Note: Delete word EXIT(s) if exit number is used.



Figure 2E-22. Examples of Interchange Advance Guide Signs, Exit Number Plaques, and LEFT Plaque

2E.33 Advance Guide Signs

SUPPORT:

An Advance Guide sign (see Figure 2E-22) gives notice well in advance of the exit point of the principal destinations served by the next interchange and the distance to that interchange.

GUIDANCE:

For major and intermediate interchanges (see Section 2E.32), Advance Guide signs should be placed at 1/2 mile and at 1 mile in advance of the exit with a third Advance Guide sign placed at 2 miles in advance of the exit if spacing permits. At minor interchanges, only one Advance Guide

sign should be used. It should be located 1/2 to 1 mile from the exit gore. If the sign is located less than 1/2 mile from the exit, the distance displayed should be to the nearest 1/4 mile. Fractions of a mile, rather than decimals, should be displayed in all cases.

STANDARD:

For numbered exits to the left, a left exit number (E1-5bP) plaque (see Figure 2E-22) shall be added to the top left-hand edge of the sign.

For non-numbered exits to the left, a LEFT (E1-5aP) plaque (see Figure 2E-22) shall be added to the top left-hand edge of the sign.

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SUPPORT:

Section 2E.31 contains additional information regarding exit numbering.

STANDARD:

Advance Guide signs for multi-lane exits having an optional exit lane that also carries the through route (see Figures 2E-4, 2E-5, 2E-8, and 2E-9) and for splits with an option lane (see Figures 2E-6 and 2E-10) shall be Overhead Arrow-per-Lane or diagrammatic signs designed in accordance with Sections 2E.20 through 2E.22.

Except as provided in Section 2E.24, Advance Guide signs, if used, shall contain the distance message. Except as provided in the following Guidance, the legend on the Advance Guide signs shall be the same as the legend on the Exit Direction sign, except that the last line shall read EXIT XX MILES. If the interchange has two or more exit roadways, the bottom line shall read EXITS XX MILES.

GUIDANCE:

Where interchange exit numbers are used, the word EXIT(S) should be omitted from the bottom line.

OPTION:

Where the distance between interchanges is more than 1 mile, but less than 2 miles, the first Advance Guide sign may be closer than 2 miles, but not placed so as to overlap the signing for the previous exit. Duplicate Advance Guide signs or Interchange Sequence Series signs may be placed in the median on the opposite side of the roadway and are not included in the minimum requirements of interchange signing.

GUIDANCE:

Where there is less than 800 feet between interchanges, Interchange Sequence Series signs (see Section 2E.40) should be used instead of Advance Guide signs for the affected interchanges.

The Advance Guide signs for the last exit from a highway before it becomes a facility on which toll payments are required should include the LAST EXIT BEFORE TOLL (W16-16P) plaque (see Section 2F.10 and Figure 2F-3). The plaque should be installed above the Advance Guide signs.

OPTION:

If there is insufficient space above the Advance Guide sign because of the presence of an exit number plaque, the W16-16P plaque may be installed below the Advance Guide sign.

2E.34 Next Exit Plaques

OPTION:

Where the distance to the next interchange is unusually long, a Next Exit plaque (see Figure 2E-23) may be installed to inform road users of the distance to the next interchange.

GUIDANCE:

The Next Exit plaque should not be used unless the distance between successive interchanges is more than 5 miles.

STANDARD:

The Next Exit plaque shall carry the legend NEXT EXIT XX MILES. If the Next Exit plaque is used, it shall be placed below the Advance Guide sign nearest the interchange. It shall be mounted so as to not adversely affect the breakaway feature of the sign support structure.

OPTION:

The legend for the Next Exit plaque may be displayed in either one or two lines as shown in Figure 2E-23.

SUPPORT:

The one-line message on the Next Exit plaque is the more desirable choice unless the message causes the sign to have a horizontal dimension greater than that of the Advance Guide sign.



Figure 2E-23. Next Exit Plaques

GUIDANCE:

Exit Direction signs should be used at minor interchanges.

Post-mounted Exit Direction signs should be installed at the beginning of the deceleration lane. If there is less than 300 feet from the upstream end of the deceleration lane to the theoretical gore (see Figure 3B-8), the Exit Direction sign should be installed overhead over the exiting lane in the vicinity of the theoretical gore.

STANDARD:

Except where Overhead Arrow-per-Lane guide signs are used (see Section 2E.21 and the following paragraph, where a through lane is being terminated (dropped) at an exit, the Exit Direction sign shall be placed overhead at the theoretical gore (see Figures 2E-8 through 2E-11, and 2E-14 through 2E-16).

Except as provided in the first Option in Section 2E.21, where Overhead Arrow-per-Lane guide signs are used for the Advance Guide sign(s) for a multi-lane exit having an optional exit lane that also carries the through route or for a split with an option lane (see Section 2E.21), an Overhead Arrow-per-Lane guide sign shall also be used instead of the Exit Direction sign. This Overhead Arrow-per-Lane guide sign shall include the appropriate exit number (E1-5P or E1-5bP) plaque (if a numbered exit) and it shall be located near, but not downstream from, the point where the outside edge of the dropped lane begins to diverge from the mainline (see Figures 2E-4 through 2E-6).

The following provisions shall govern the design and application of overhead Exit Direction signs:

- A. The sign shall carry the exit number (if exit numbering is used), the route number, cardinal direction, and destination, as applicable, with a diagonally upward-pointing directional arrow (see Figure 2E-26).
- B. The message EXIT ONLY in black on a yellow sign panel (E11-1d or E11-1e) shall be used on the overhead Exit Direction sign to advise road users of a lane drop situation (see Figures 2E-8 through 2E-11). The sign shall comply with the provisions of Section 2E.24.

GUIDANCE:

For numbered exits to the right, an exit number (E1-5P) plaque (see Figure 2E-22) should be added to the top right-hand edge of the sign.

STANDARD:

For numbered exits to the left, a left exit number (E1-5bP) plaque (see Figure 2E-22) shall be added to the top left-hand edge of the sign.

For non-numbered exits to the left, a LEFT (E1-5aP) plaque (see Figure 2E-22) shall be added to the top left-hand edge of the sign.

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SUPPORT:

Section 2E.31 contains additional information regarding exit numbering.

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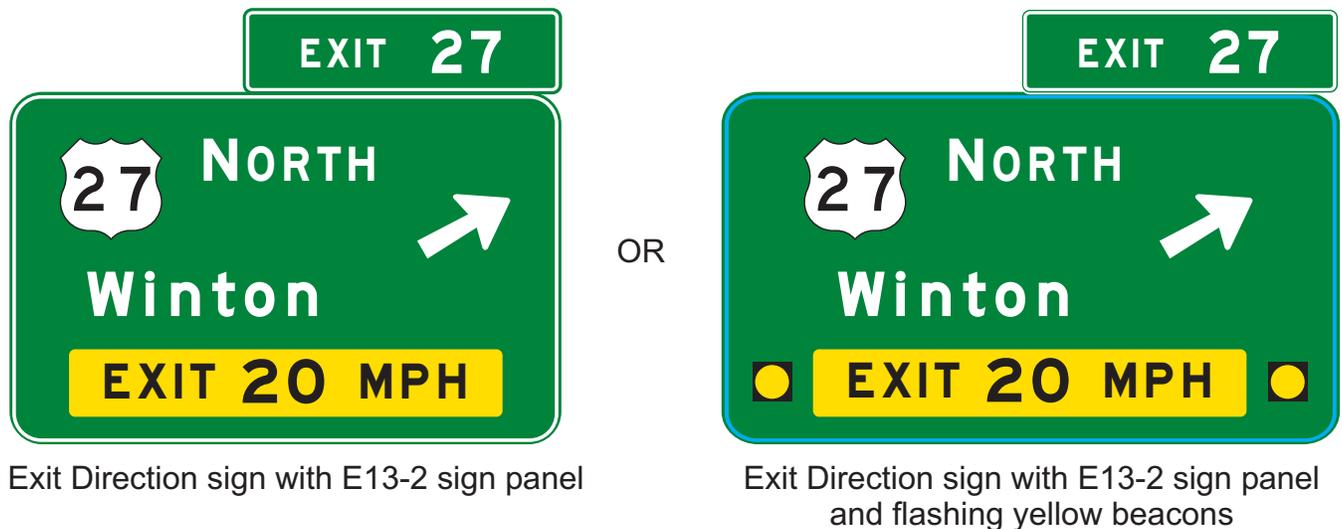


Figure 2E-27. Interchange Exit Direction Sign with an Advisory Speed Panel



Figure 2E-28. Exit Gore Signs

OPTION:

In some cases, principally in urban areas, where restricted sight distance because of structures or unusual alignment make it impossible to locate the Exit Direction sign without violating the required minimum spacing (see Section 2E.33) between major guide signs, Interchange Sequence signs (see Section 2E.40) may be substituted for an Advance Guide sign.

GUIDANCE:

At multi-exit interchanges, the Exit Direction sign should be located directly over the exiting lane for the first exit. At the same location, and normally over the right-hand through lane, an Advance Guide sign for the second exit should be located. Only for those conditions where the through movement is not evident should a confirmatory message (Pull-Through sign as shown in Figure 2E-2) be used over the left lane(s) to guide road users traveling through an interchange. In the interest of sign spreading, three signs on one structure should not be used. When the freeway or expressway is on an overpass, the Exit Direction sign should be installed on an overhead support over the exit lane in advance of the gore point.

OPTION:

If the second exit is beyond an underpass, the Exit Direction sign may be mounted on the face of the overhead structure.

Where extra emphasis of an especially low advisory ramp speed is needed, an EXIT XX MPH (E13-2) sign panel (see Figure 2E-27) may be placed at the bottom of the Exit Direction sign to supplement, but not to replace, the exit or ramp advisory speed warning signs.

GUIDANCE:

At the last exit from a highway before it becomes a facility on which toll payments are required, the LAST EXIT BEFORE TOLL (W16-16P) plaque (see Section 2F.10 and Figure 2F-3) should be installed above the Exit Direction sign.

OPTION:

If there is insufficient space above the Exit Direction sign because of the presence of an Exit Number (E1-5P) plaque, the W16-16P plaque may be mounted below the Exit Direction sign.

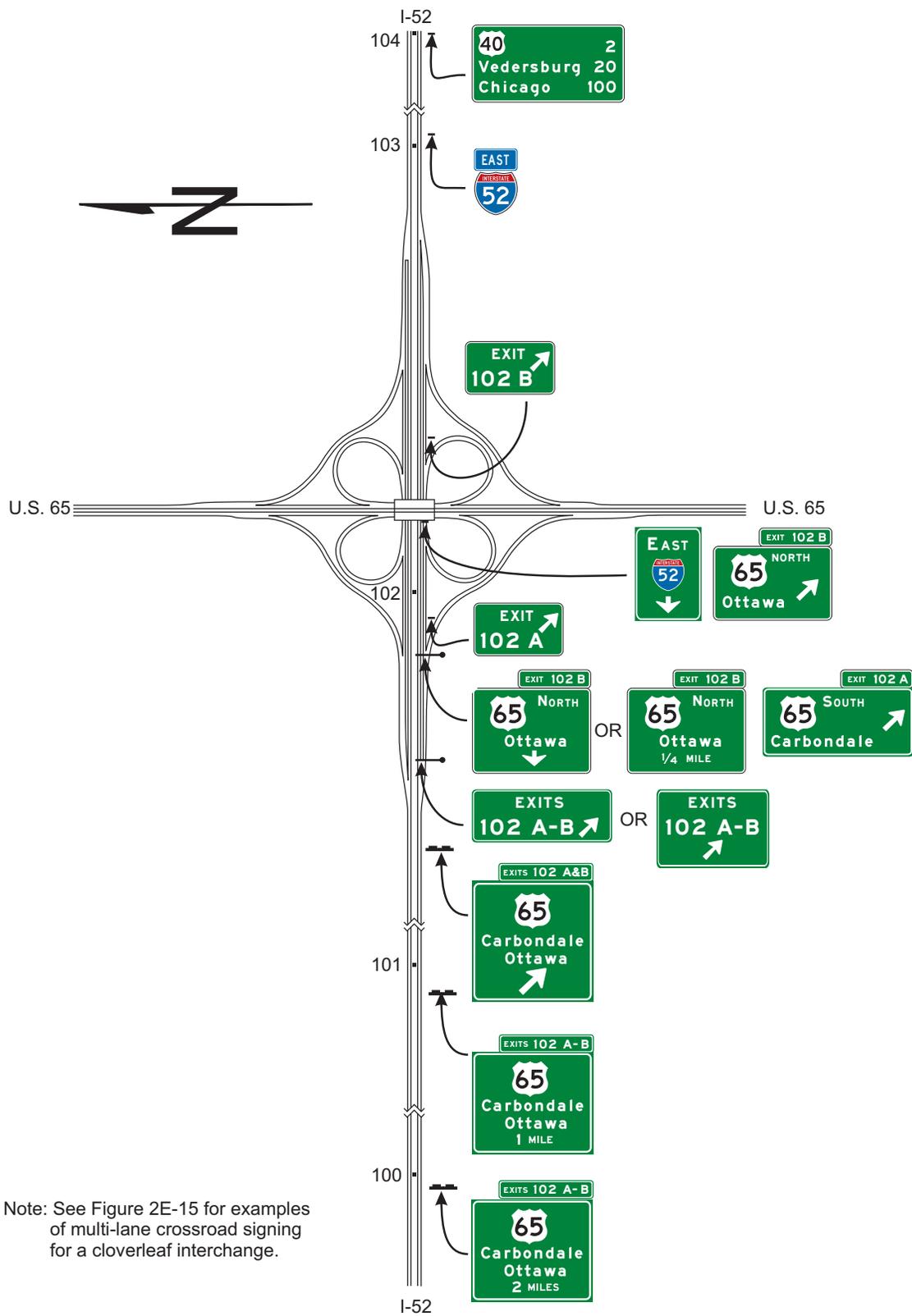
2E.37 Exit Gore Signs (E5-1 Series)

SUPPORT:

The Exit Gore (E5-1 or E5-1a) sign (see Figure 2E-28) in the gore indicates the exiting point or the place of departure from the main roadway. Consistent application of this sign at each exit is important.

STANDARD:

The gore shall be defined as the area located between the main roadway and the ramp just beyond where the ramp branches from the main roadway. The Exit Gore sign shall be located in the gore and shall carry the word EXIT or EXIT XX (if interchange numbering is used) and an appropriate upward slanting arrow. If suffix letters are used for exit numbering at a multi-exit interchange, the suffix letter shall also be included on the Exit Gore sign and shall be separated from the exit number by a space having a width of between 1/2 and 3/4 of the height of the suffix letter. Breakaway or yielding supports shall be used.



Note: See Figure 2E-15 for examples of multi-lane crossroad signing for a cloverleaf interchange.

Figure 2E-36. Examples of Guide Signs for a Full Cloverleaf Interchange with Collector-Distributor Roadways

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GUIDANCE:

The Pay Toll Advance Warning sign should be installed overhead at approximately 1 mile and 1/2 mile in advance of mainline toll plazas at which some or all lanes are required to come to a stop to pay a toll (see Sections 2F.14 and 2F.15).

OPTION:

If there is insufficient space for the W9-6 sign at the 1-mile or 1/2-mile advance locations, the Pay Toll Advance Warning (W9-6P) plaque (see Section 2F.7) may be installed at those advance locations above the appropriate guide sign(s) that relate to toll payment types.

An additional W9-6 sign may be installed approximately 2 miles in advance of a mainline toll plaza. This sign may be either overhead or post-mounted.

If the visibility of a ramp toll plaza at which some or all lanes are required to come to a stop to pay a toll is limited, the W9-6 sign may also be installed in advance of the ramp toll plaza.

2F.7 Pay Toll Advance Warning Plaque (W9-6P)



W9-6P

OPTION:

The Pay Toll Advance Warning (W9-6P) plaque may be installed above the appropriate guide sign(s) relating to toll payment types at the 1-mile and/or 1/2-mile advance locations on the approach to a toll plaza if there is insufficient space for the W9-6 sign (see Section 2F.6) at those advance locations.

STANDARD:

The W9-6P plaque shall be a horizontal rectangle with black legend and border on a yellow background. The legend shall include the distance to the toll plaza and, except for toll-ticket facilities, the toll for passenger or 2-axle vehicles. Where the toll for passenger or 2-axle vehicles is variable by time of day, a changeable message element shall be incorporated into the W9-6P plaque to display the toll in effect. For toll plazas where road users entering a toll-ticket facility are issued a toll ticket, the legend PAY TOLL shall be replaced with a suitable legend such as TAKE TICKET.

OPTION:

The distance to the toll plaza may be omitted from the W9-6P plaque if the distance is displayed on the guide sign that the plaque accompanies.

The toll for passenger or 2-axle vehicles may be omitted from the W9-6P plaque if the toll information is displayed on the guide sign that the plaque accompanies.

2F.8 Stop Ahead Pay Toll Warning Sign (W9-6a)



W9-6a

STANDARD:

The Stop Ahead Pay Toll (W9-6a) sign shall be a horizontal rectangle with a black legend and border on a yellow background. The legend shall include STOP AHEAD PAY TOLL and, except for toll-ticket facilities, the toll for passenger or 2-axle vehicles. Where the toll for passenger or 2-axle vehicles is variable by time of day, a changeable message element shall be incorporated into the W9-6a sign to display the toll in effect. For toll plazas where road users entering a toll-ticket facility are issued a toll ticket, the legend PAY TOLL shall be replaced with a suitable legend such as TAKE TICKET.

GUIDANCE:

The Stop Ahead Pay Toll sign should be installed overhead downstream from the W9-6 sign that is 1/2 mile in advance of a mainline toll plaza where some or all of the lanes are required to come to a stop to pay a toll (see Sections 2F.14 and 2F.15). The location of the overhead sign should coincide with the approximate location where the mainline lanes begin to widen on the approach to the toll plaza lanes.

Where open-road tolling is used in addition to a toll plaza at a particular location, the W9-6a sign should be located such that the message is clearly related to the lanes that access the toll plaza and not to the open-road tolling lanes.

OPTION:

If there is insufficient space for the W9-6a sign at the recommended location, the Stop Ahead Pay Toll (W9-6aP) plaque (see Section 2F.9) may be installed at that location above the appropriate guide sign that relates to toll payment types.

If the visibility of a ramp toll plaza at which some or all lanes are required to come to a stop to pay a toll is limited, the W9-6a sign may also be installed in advance of the ramp toll plaza.

2F.9 Stop Ahead Pay Toll Warning Plaque (W9-6aP)



W9-6aP

OPTION:

The Stop Ahead Pay Toll (W9-6aP) plaque may be installed above the appropriate guide sign at the location specified for the Stop Ahead Pay Toll (W9-6a) sign (see Section 2F.8) if there is insufficient space for the W9-6a sign at that location.

STANDARD:

The W9-6aP plaque shall be a horizontal rectangle with black legend and border on a yellow background. The legend shall include STOP AHEAD PAY TOLL and, except for toll-ticket facilities, the toll for passenger or 2-axle vehicles. Where the toll for passenger or 2-axle vehicles is variable by time of day, a changeable message element shall be incorporated into the W9-6aP plaque to display the toll in effect. For toll plazas where road users entering a toll-ticket facility are issued a toll ticket, the legend PAY TOLL shall be replaced with a suitable legend such as TAKE TICKET.

OPTION:

The toll for passenger or 2-axle vehicles may be omitted from the W9-6aP plaque if the toll information is displayed on the guide sign that the plaque accompanies.

2F.10 LAST EXIT BEFORE TOLL Warning Plaque (W16-16P)



W16-16P

GUIDANCE:

The LAST EXIT BEFORE TOLL (W16-16P) plaque should be used to notify road users of the last exit from a highway before it becomes a facility on which toll payments are required. The plaque should be installed above or below the appropriate guide signs for the exit (see Sections 2E.33 and 2E.36).

STANDARD:

The W16-16P plaque shall have a black legend and border on a yellow background.

2F.11 TOLL Auxiliary Sign (M4-15)



M4-15

STANDARD:

The TOLL (M4-15) auxiliary sign (see Figure 2F-4) shall have a black legend and border on a yellow background and shall be mounted directly above the route sign of a numbered toll highway or, if used, above the cardinal direction and alternative route auxiliary signs, in any route sign assembly providing directions from a non-toll highway to the toll highway or to a segment of a highway on which the payment of a toll is required.

2F.12 Electronic Toll Collection (ETC) Account-Only Auxiliary Signs (M4-16 and M4-20)



M4-16



M4-20

STANDARD:

In any route sign assembly providing directions from a non-toll highway to a toll facility, or to a tolled segment of a highway, where electronic toll collection (ETC) is the only payment method accepted and all vehicles are required to have a registered ETC account, the ETC Account-Only (M4-20) auxiliary sign (see Figure 2F-4) shall be mounted directly below the route sign of the numbered or named toll facility. The M4-20 auxiliary sign shall have a white border and purple background and incorporate the pictograph adopted by the toll facility's ETC payment system and the word ONLY in black letters on a white panel set on the purple background of the sign.

OPTION:

The NO CASH (M4-16) auxiliary sign (see Figure 2F-4) with a black legend and border on a white background may be used in a route sign assembly directly below the M4-20 auxiliary sign.

PART 2. SIGNS

Chapter 2G. Preferential and Managed Lane Signs

2G.1 Scope

SUPPORT:

Preferential lanes are lanes designated for special traffic uses such as high-occupancy vehicles (HOVs), light rail, buses, taxis, or bicycles. Preferential lane treatments might be as simple as restricting a turning lane to a certain class of vehicles during peak periods, or as sophisticated as providing a separate roadway system within a highway corridor for certain vehicles.

Preferential lanes might be barrier-separated (on a separate alignment or physically separated from the other travel lanes by a barrier or median), buffer-separated (separated from the adjacent general-purpose lanes only by a narrow buffer area created with longitudinal pavement markings), or contiguous (separated from the adjacent general-purpose lanes only by a lane line). Preferential lanes might allow continuous access with the adjacent general-purpose lanes or restrict access only to designated locations. Preferential lanes might be operated in a constant direction or operated as reversible lanes. Some reversible preferential lanes on a divided highway might be operated counter-flow to the direction of traffic on the immediately adjacent general-purpose lanes.

Preferential lanes might be operated on a 24-hour basis, for extended periods of the day, during peak travel periods only, during special events, or during other activities.

Open-road tolling lanes and toll plaza lanes that segregate traffic based on payment method are not considered preferential lanes. Chapter 2F contains information regarding signing of open-road tolling lanes and toll plaza lanes.

Managed lanes typically restrict access with the adjacent general-purpose lanes to designated locations only.

Under certain operational strategies, such as the occupancy requirement of an HOV lane changing in response to actual congestion levels, a managed lane is a special type of preferential lane (see Sections 2G.3 through 2G.7).

A managed lane operated on a real-time basis in response to changing conditions might be operated as an HOV lane for a period of time as needed to manage congestion levels.

Sections 2G.16 through 2G.18 contain additional information regarding signs for managed lanes that use tolling or pricing as a management strategy.

Section 9B.4 contains information regarding Preferential Lane signs for bike lanes.

2G.2 Sizes of Preferential and Managed Lane Signs

STANDARD:

Except as provided in Section 2A.11, the sizes of preferential and managed lane signs that have standardized designs shall be as shown in Table 2G-1.

SUPPORT:

Section 2A.11 contains information regarding the applicability of the various columns in Table 2G-1.

OPTION:

Signs larger than those shown in Table 2G-1 may be used (see Section 2A.11).

2G.3 Regulatory Signs for Preferential Lanes – General

STANDARD:

When a preferential lane is established, the Preferential Lane regulatory signs (see Figure 2G-1) and pavement markings (see Chapter 3D) for these lanes shall be used to advise road users.

SUPPORT:

Preferential Lane (R3-10 series through R3-15 series) regulatory signs consist of several different general types of regulatory signs as follows (see Figure 2G-1):

- A. Vehicle Occupancy Definition signs define the vehicle occupancy requirements applicable to an HOV lane (such as “2 OR MORE PERSONS PER VEHICLE”) or types of vehicles not meeting the minimum occupancy requirement (such as motorcycles or ILEVs) that are allowed to use an HOV lane (see Section 2G.4).
- B. Periods of Operation signs notify road users of the days and hours during which the preferential restrictions are in effect (see Section 2G.5).
- C. Preferential Lane Advance signs notify road users that a preferential lane restriction begins ahead (see Section 2G.6).
- D. Preferential Lane Ends signs notify users of the termination point of the preferential lane restrictions (see Section 2G.7).

Sign or Plaque	Sign Designation	Section	Conventional Road		Expressway	Freeway	Oversized
			Single Lane	Multi-Lane			
Preferential Lane Vehicle Occupancy Definition (post-mounted)	R3-10,10a	2G.4	30 x 42	30 x 42	36 x 60	78 x 96	78 x 96
Preferential Lane Periods of Operation (post-mounted)	R3-11 series	2G.5	30 x 42	30 x 42	36 x 60	78 x 96	78 x 96
Motorcycles Allowed (plaque)	R3-11P	2G.3	30 x 15	30 x 15	36 x 18	78 x 36	78 x 36
Preferential Lane Ahead or Ends (post-mounted)	R3-12 series	2G.6	30 x 42	30 x 42	36 x 60	48 x 84	48 x 84
Preferential Lane Vehicle Occupancy Definition (overhead)	R3-13,13a	2G.4	66 x 36	66 x 36	84 x 48	144 x 78	144 x 78
HOV Lane Periods of Operation (overhead)	R3-14,14a,14b	2G.5	72 x 60	72 x 60	96 x 72	144 x 108	144 x 108
Preferential Lane Periods of Operation (overhead)	R3-14c	2G.5	90 x 60	90 x 60	108 x 72	156 x 102	168 x 102
HOV Lane Ahead (overhead)	R3-15	2G.6	66 x 36	66 x 36	84 x 48	102 x 60	102 x 60
HOV Lane Begins XX Miles (overhead)	R3-15a	2G.6	78 x 42	78 x 42	102 x 54	132 x 72	132 x 72
HOV Lane Ends (overhead)	R3-15b,15c	2G.7	66 x 36	66 x 36	84 x 48	102 x 60	102 x 60
Preferential Lane Ahead or Ends (overhead)	R3-15d,15e]	2G.7	42 x 36	42 x 36	54 x 48	72 x 60	72 x 60
Preferential Lane Ahead Vehicle Occupancy Definition (post-mounted)	R3-40	2G.17	---	---	54 x 66	54 x 66	66 x 78
Priced Managed Lane Ends (post-mounted)	R3-42,42b	2G.17	---	---	48 x 60	48 x 60	60 x 78
Priced Managed Lane Ends Advance (post-mounted)	R3-42a,42c	2G.17	---	---	48 x 66	48 x 66	60 x 84
Priced Managed Lane Vehicle Occupancy Definition	R3-43	2G.17	---	---	138 x 66	138 x 66	---
Priced Managed Lane Periods of Operation (overhead)	R3-44	2G.17	---	---	90 x 84	90 x 84	---
Priced Managed Lane Periods of Operation (overhead)	R3-44a	2G.17	---	---	132 x 84	132 x 84	---
Priced Managed Lane Ends (overhead)	R3-45	2G.17	---	---	90 x 66	90 x 66	---
Priced Managed Lane Ends (overhead)	R3-45a	2G.17	---	---	114 x 66	114 x 66	---
Priced Managed Lane Toll Rate	R3-48	2G.17	---	---	Varies	Varies	---
Priced Managed Lane Toll Rate	R3-48a	2G.17	---	---	Varies	Varies	---
HOV (plaque)	W16-11P	2G.9	24 x 12	24 x 12	30 x 18	30 x 18	30 x 18
Preferential Lane Entrance Gore	E8-1	2G.10	---	---	48 x 96	48 x 96	---
Preferential Lane Intermediate Entrance Gore	E8-1a	2G.10	---	---	48 x 84	48 x 84	---
Preferential Lane Entrance Direction (overhead)	E8-2	2G.11	---	---	222 x 72	222 x 72	---
Preferential Lane Entrance Direction (post-mounted)	E8-2a	2G.11	---	---	186 x 108	186 x 108	---
Preferential Lane Entrance Advance	E8-3	2G.11	---	---	186 x 96	186 x 96	---
Preferential Lane Direct Exit Gore	E8-4	2G.15	---	---	60 x 78	60 x 78	---
Preferential Lane Intermediate Egress Direction	E8-5	2G.13	---	---	Varies x 90	Varies x 90	---
Preferential Lane Intermediate Egress Advance	E8-6	2G.13	---	---	Varies x 84	Varies x 84	---

Notes:

1. Larger signs may be used when appropriate
2. Dimensions in inches are shown as width x height

Table 2G-1. Managed and Preferential Lanes Sign and Plaque Minimum Sizes

GUIDANCE:

On conventional roads, for general-purpose lanes that become preferential lanes, a post-mounted (R3-12e) or overhead (R3-15a) Preferential Lane Advance sign should be installed in advance of the beginning of or initial entry point to the preferential lane at a distance determined by engineering judgment based on speed, traffic characteristics, and other site-specific considerations. The distance selected should provide adequate opportunity for ineligible vehicles to vacate the lane prior to the beginning of the restriction.

On freeways and expressways, for general-purpose lanes that become preferential lanes, an overhead Preferential Lane Advance (R3-15a) sign should be installed at least 1 mile in advance of the beginning of the preferential lane restriction.

OPTION:

Additional post-mounted or overhead Preferential Lane Advance signs may be placed farther in advance of or closer to the beginning or initial entry points to a preferential lane.

2G.7 Preferential Lane Ends Regulatory Signs (R3-12a, R3-12b, R3-12c, R3-12d, R3-12g, R3-12h, R3-15b, R3-15c, and R3-15e)

STANDARD:

A post-mounted Preferential Lane Ends (R3-12b or R3-12h) sign shall be installed at least 1/2 mile in advance of the termination of a preferential lane.

Except as provided in the second Option paragraph, a post-mounted Preferential Lane Ends (R3-12a or R3-12g) sign shall be installed at the point where a preferential lane and restriction end and traffic must merge into the general-purpose lanes.

A post-mounted Preferential Lane Ends (R3-12d) sign shall be installed at least 1/2 mile in advance of the point where a preferential lane restriction ends and the lane becomes a general-purpose lane.

Except as provided in the third Option paragraph, a post-mounted Preferential Lane Ends (R3-12c) sign shall be installed at the point where a preferential lane restriction ends and the lane becomes a general-purpose lane.

OPTION:

The legends on the R3-12g and R3-15e signs may be modified to suit the type of preferential lane.

An overhead Preferential Lane Ends (R3-15b or R3-15e) sign may be installed instead of or in addition to a post-mounted R3-12a or R3-12g sign at the point where a prefer-

ential lane and restriction ends and traffic must merge into the general-purpose lanes.

An overhead Preferential Lane Ends (R3-15c) sign may be installed instead of or in addition to a post-mounted R3-12c sign at the point where the preferential lane restriction ends and the lane becomes a general-purpose lane.

2G.8 Warning Signs on Median Barriers for Preferential Lanes

OPTION:

When a warning sign applicable only to a preferential lane is installed on a median barrier with limited lateral clearance to the adjacent travel lanes or shoulders, the warning sign may have a vertical rectangular shape. For a High Occupancy Vehicle lane, such signs may be used instead of using the HOV Plaque (W16-11P) (see Section 2G.9) with a standard diamond-shaped warning sign.

STANDARD:

When a vertical rectangular-shaped warning sign applicable only to a preferential lane is installed on a median barrier, the top portion of the sign shall be comprised of a white symbol or legend denoting the type of preferential lane (such as the diamond symbol for HOV or the legend BUS LANE) on a black background with a white border, and the bottom portion of the sign shall be comprised of the standard word message or symbol of the standard warning sign as a black legend on a yellow background with a black border (see Figure 2G-4).

GUIDANCE:

Where lateral clearance is limited, such as when a post-mounted warning sign applicable only to a preferential lane is installed on a median barrier, the edges of the sign should not project beyond the outer edges of the barrier.

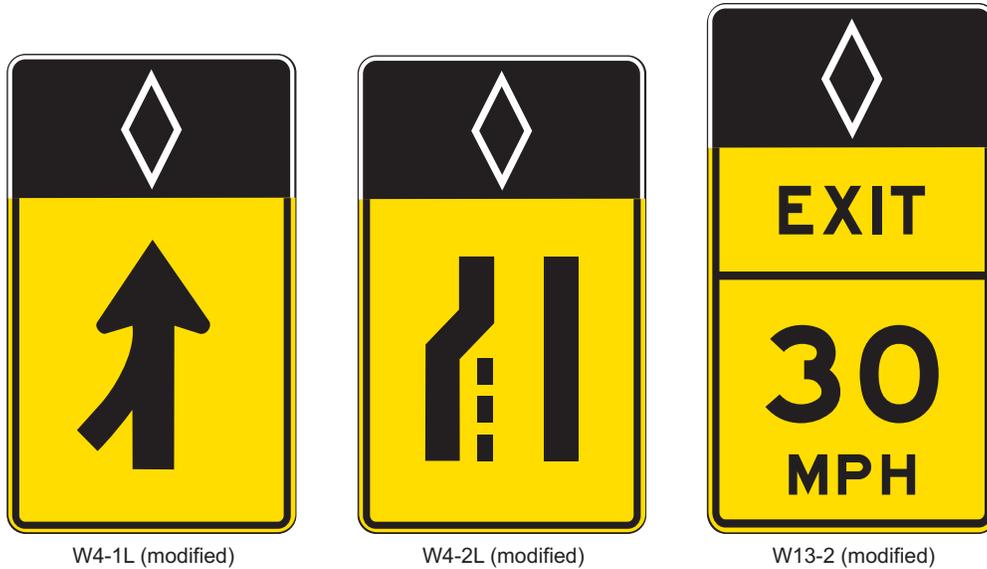
OPTION:

Where lateral clearance is limited, warning signs applicable only to a preferential lane that are post-mounted on a median barrier and that are 72 inches or less in width may be skewed up to 45 degrees in order to fit within the barrier width or may be mounted higher, such that the vertical clearance to bottom of the sign, light fixture, or its structural support, whichever is lowest, is not less than 14 feet above any portion of the pavement and shoulders.

STANDARD:

Where lateral clearance is limited, Preferential Lane warning signs that are post-mounted on a median barrier and that are wider than 72 inches shall be mounted with a vertical clearance that complies with the provisions of Section 2A.18 for overhead mounting.

A - BARRIER-MOUNTED RECTANGULAR WARNING SIGNS



B - WARNING PLAQUE FOR USE ABOVE STANDARD DIAMOND-SHAPED WARNING SIGNS



Note: An HOV lane example (diamond symbol) is illustrated. For other types of preferential lanes, the appropriate symbol or word message (see Section 2G.3) shall be displayed in white on the black background of the top portion of these signs.

Figure 2G-4. Examples of Warning Signs and Plaques Applicable Only to Preferential Lanes

2G.9 High-Occupancy Vehicle (HOV) Plaque (W16-11P)

OPTION:

In situations where there is a need to warn drivers in an HOV lane of a specific condition, a HOV (W16-11P) plaque (see Figure 2G-4) may be used above a warning sign. The HOV plaque may be used to differentiate a warning sign specific for HOV lanes when the sign is also visible to traffic on the adjacent general-purpose roadway. Among the warning signs that may be possible applications of the HOV plaque are the Advisory Exit Speed, Added Lane, and Merge signs.

The diamond symbol may be used instead of the word message HOV on the W16-11P plaque. When appropriate, the words LANE or ONLY may be used on this plaque.

SUPPORT:

Section 2G.8 contains information regarding warning signs that can be mounted on barriers for HOV or other types of preferential lanes.

2G.10 Preferential Lane Guide Signs – General

SUPPORT:

Preferential lanes are used on freeways, expressways, and conventional roads. Except as otherwise provided, Sections 2G.10 through 2G.15 apply only to guide signs for preferential lanes on freeways and expressways.

GUIDANCE:

On conventional roads, guide signs applicable only to preferential lanes are ordinarily not needed, but if used they should comply with the provisions for guide signs in Chapter 2D and any principles for Preferential Lane guide signs in Sections 2G.10 through 2G.15 that engineering judgment finds to be appropriate for the conditions.

SUPPORT:

Consistency in signs and pavement markings for preferential lanes plays a critical role in building public awareness, understanding, and acceptance, and makes enforcement more effective.



E8-3

Note: An example of an HOV Lane (diamond symbol) sign is illustrated. For other types of preferential lanes, the appropriate symbol or word message (see Section 2G.3) is displayed in white on the black background of the left-hand portion of this sign.

Figure 2G-5. Example of an Overhead Advance Guide Sign for a Preferential Lane Entrance



E8-2
(overhead only)



E8-2a
(post-mounted only)

A changeable message sign may be incorporated into an overhead preferential lane guide sign to indicate the status of a reversible operation as shown in the following example:



Lane Open



Lane Closed

Note: Examples of HOV Lane (diamond symbol) signs are illustrated. For other types of preferential lanes, the appropriate symbol or word message (see Section 2G.3) is displayed in white on the black background of the top left-hand portion of these signs.

Figure 2G-6. Examples of Overhead or Post-Mounted Preferential Lane Entrance Direction Signs



E8-1



E8-1a

Note: Examples of HOV Lane (diamond symbol) signs are illustrated. For other types of preferential lanes, the appropriate symbol or word message (see Section 2G.3) is displayed in white on the black background of the top portion of these signs.

Figure 2G-7. Entrance Gore Signs for Barrier-Separated Preferential Lanes

GUIDANCE:

Preferential Lane Exit Destination guide signs, identifying final destination and downstream exit locations accessible from the preferential lane (see Figures 2G-8, 2G-13, 2G-14, and 2G-16), should be installed in advance of the initial entry points to access-restricted preferential lanes (such as barrier- and buffer-separated). These signs should be located based on the priority of the message, the available space, the existing signs on adjacent general-purpose traffic lanes, roadway and traffic characteristics, the proximity to existing overhead signs, the ability to install overhead signs, and other unique local factors.

STANDARD:

Advance destination guide signs for preferential lanes shall include an upper section displaying a black legend that includes the type of preferential lane and the word “EXITS,” such as “HOV EXITS,” on a white background. For preferential lanes that incorporate a vehicle occupancy requirement, the white diamond symbol on a black background shall be displayed at the left edge of this upper section (see Figure 2G-8).

SUPPORT:

Figure 2G-8 shows an example of signs for the initial entry point to a preferential lane.

2G.12 Guide Signs for Intermediate Entry Points to Preferential Lanes

STANDARD:

For barrier-separated, buffer-separated, and contiguous preferential lanes where entry is restricted only to designated

points, an overhead Preferential Lane Entrance Direction sign shall be provided at intermediate entry points to the preferential lane from the general-purpose lanes.

GUIDANCE:

For barrier- and buffer-separated preferential lanes where intermediate entry from the general-purpose lanes is provided via a separate lane or ramp (see Figure 2G-9), at least one Advance Guide sign should be provided in addition to the Preferential Lane Entrance Direction sign.

For access-restricted preferential lanes where intermediate entrance and egress are at the same designated access location, the Preferential Lane Entrance Direction sign should be located between 1/2 and 1/4 of the length of the designated entry area, as measured from the downstream end of the entry area (see Figure 2G-10).

STANDARD:

The Advance Guide signs, if used for intermediate entry points to a preferential lane from the general purpose lanes, shall be overhead.

OPTION:

Advance Guide signs may be provided at approximately 1/2 mile, 1 mile, and 2 miles in advance of intermediate entry points from the general-purpose lanes to a preferential lane.

STANDARD:

Advance Guide and Preferential Lane Entrance Direction signs for intermediate entry points shall not include the word “EXIT” (see Section 2G.10).

MN Rev. 1

PART 2. SIGNS

Chapter 2I. General Service Signs

2I.1 Sizes of General Service Signs

STANDARD:

Except as provided in Section 2A.11, the sizes of General Service signs that have a standardized design shall be as shown in Table 2I-1.

SUPPORT:

Section 2A.11 contains information regarding the applicability of the various columns in Table 2I-1.

OPTION:

Signs larger than those shown in Table 2I-1 may be used (see Section 2A.11).

Sign	Sign Designation	Section	Conventional Road	Freeway or Expressway
Rest Area XX Miles	D5-1	2I.5	66 x 36*	96 x 54*
Rest Area Next Right	D5-1a	2I.5	78 x 36*	120 x 60* (F) 114 x 48* (E)
Rest Area w/arrow	D5-2	2I.5	66 x 36*	96 x 54*
Rest Area Gore	D5-2a	2I.5	42 x 48*	78 x 78* (F) 66 x 72* (E)
Rest Area w/horizontal arrow	D5-5	2I.5	42 x 48*	---
Next Rest Area XX Miles	D5-6	2I.5	60 x 48*	90 x 72*
Rest Area Tourist Info Center XX Miles	D5-7	2I.8	90 x 72*	114 x 102* (F) 132 x 96* (E)
Rest Area Tourist Info Center w/arrow	D5-8	2I.8	84 x 72*	120 x 102* (F) 120 x 96* (E)
Rest Area Tourist Info Center Next Right	D5-11	2I.8	90 x 72*	144 x 102* (F) 132 x 96* (E)
Interstate Oasis	D5-12	2I.4	---	156 x 78
Interstate Oasis (plaque)	D5-12P	2I.4	---	114 x 48
Brake Check Area XX Miles	D5-13	2I.6	84 x 48	126 x 72
Brake Check Area w/arrow	D5-14	2I.6	78 x 60	96 x 72
Chain-Up Area XX Miles	D5-15	2I.7	66 x 48	96 x 72
Chain-Up Area w/arrow	D5-16	2I.7	72 x 54	96 x 66
Wayside Rest ½ Mile on Right	D5-X1	2I.5	36 x 36	36 x 36 (E)
Wayside Rest plaques	D5-X1a	2I.5	36 x 12	36 x 12 (E)
Historical Marker	D5-X1b	2I.5	36 x 18	36 x 18
Geological Marker	D5-X1c	2I.5	36 x 18	36 x 18
Wayside Rest w/arrow	D5-X2	2I.5	36 x 30	36 x 30 (E)
Public Boat Launch w/arrow and symbol	D7-X7	2I.5.1	Varies x 30	Varies x 30 (E)
Public Canoe Access w/arrow and symbol	D7-X7a	2I.5.1	Varies x 30	Varies x 30 (E)
Public Water Access w/arrow	DNR sign	2I.5.1	18 x 30	18 x 30 (E)
Telephone	D9-1	2I.2	24 x 24	30 x 30
Hospital	D9-2	2I.2	24 x 24	30 x 30
Camping	D9-3	2I.2	24 x 24	30 x 30

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

Sign	Sign Designation	Section	Conventional Road	Freeway or Expressway
Trailer Camping	D9-3a	2I.2	24 x 24	30 x 30
Litter Container	D9-4	2I.2	24 x 30	36 x 48
Handicapped	D9-6	2I.2	24 x 24	30 x 30
Van Accessible (plaque)	D9-6P	2I.2	18 x 9	---
Gas	D9-7	2I.2	24 x 24	30 x 30
Food	D9-8	2I.2	24 x 24	30 x 30
Lodging	D9-9	2I.2	24 x 24	30 x 30
Tourist Information	D9-10	2I.2	24 x 24	30 x 30
Diesel Fuel	D9-11	2I.2	24 x 24	30 x 30
Alternative Fuel - Compressed Natural Gas	D9-11a	2I.2	24 x 24	30 x 30
Electric Vehicle Charging	D9-11b	2I.2	24 x 24	30 x 30
Electric Vehicle Charging (plaque)	D9-11bP	2I.2	24 x 18	30 x 24
Alternative Fuel - Ethanol	D9-11c	2I.2	24 x 24	30 x 30
RV Sanitary Station	D9-12	2I.2	24 x 24	30 x 30
Emergency Vehicle Services	D9-13	2I.2	24 x 24	30 x 30
Hospital (plaque)	D9-13aP	2I.2	24 x 12	30 x 12
Ambulance Station (plaque)	D9-13bP	2I.2	24 x 12	30 x 15
Emergency Medical Care (plaque)	D9-13cP	2I.2	24 x 18	30 x 24
Trauma Center (plaque)	D9-13dP	2I.2	24 x 12	30 x 15
Police	D9-14	2I.2	24 x 24	30 x 30
Propane gas	D9-15	2I.2	24 x 24	30 x 30
Truck Parking	D9-16	2I.2	24 x 24	30 x 30
Next Services XX Miles (plaque)	D9-17P	2I.2	102 x 24	156 x 30
General Services (up to 6 symbols)	D9-18	2I.3	---	96 x 60
General Services	D9-18a	2I.3	---	96 x 60
General Services (up to 6 symbols) with Action or Exit Information	D9-18b	2I.3	108 x 84	132 x 114 (F) 132 x 108 (E)
General Services with Action or Exit Information	D9-18c	2I.3	72 x 60**	132 x 108 ** (F) 108 x 84** (E)
Pharmacy	D9-20	2I.2	24 x 24	30 x 30
24-Hour (plaque)	D9-20aP	2I.2	24 x 12	30 x 12
Telecommunication Device for the Deaf	D9-21	2I.2	24 x 24	30 x 30
Wireless Internet	D9-22	2I.2	24 x 24	30 x 30
Weather Information	D12-1	2I.2	84 x 48	132 x 84
Going to Work? Try Rideshare! w/phone #	D12-2a	2I.11	60 x 30	114 x 48
Share the Ride XXX Ride w/phone & symbol	D12-2b	2I.11	102 x 36	---
Channel 9 Monitored	D12-3	2I-9	84 x 48	132 x 84
Emergency Call 911	D12-4	2I-9	66 x 30	96 x 48
Travel Info call 511 (pictograph)	D12-5	2I.10	48 x 60	66 x 72
Travel Info Call 511	D12-5a	2I.10	48 x 36	66 x 48

* The size shown is for a sign with a REST AREA and/or TOURIST INFO CENTER legend. The size should be appropriately adjusted if an alternate legend is are used.

** The size shown is for a sign with four lines of services. The size should be appropriately adjusted depending on the amount of legend displayed.

- Notes:
1. Larger signs may be used when appropriate
 2. Dimensions in inches are shown as width x height
 3. Where two sizes are shown the larger size is for freeways (F) and the smaller size if for expressways (E)

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

GUIDANCE:

When the D9-6 sign is used in accordance with Paragraph 13, and van-accessible parking is available at the facility, a VAN ACCESSIBLE (D9-6P) plaque should be mounted below the D9-6 sign.

OPTION:

The Recreational Vehicle Sanitary Station (D9-12) sign may be used as needed to indicate the availability of facilities designed for the use of dumping wastes from recreational vehicle holding tanks.

The Litter Container (D9-4) sign may be placed in advance of roadside turnouts or rest areas, unless it distracts the driver's attention from other more important regulatory, warning, or directional signs.

The Emergency Medical Services (D9-13) symbol sign may be used to identify medical service facilities that have been included in the Emergency Medical Services system under a signing policy developed by the State and/or local highway agency.

STANDARD:

The Emergency Medical Services symbol sign shall not be used to identify services other than qualified hospitals, ambulance stations, and qualified free-standing emergency medical treatment centers. If used, the Emergency Medical Services symbol sign shall be supplemented by a sign identifying the type of service provided.

OPTION:

The Emergency Medical Services symbol sign may be used above the HOSPITAL (D9-13aP) plaque or Hospital (D9-2) symbol sign or above a plaque with the legend AMBULANCE STATION (D9-13bP), EMERGENCY MEDICAL CARE (D9-13cP), or TRAUMA CENTER (D9-13dP). The Emergency Medical Services symbol sign may also be used to supplement Telephone (D9-1), Channel 9 Monitored (D12-3), or POLICE (D9-14) signs.

STANDARD:

The legend EMERGENCY MEDICAL CARE shall not be used for services other than qualified free-standing emergency medical treatment centers.

GUIDANCE:

Each State should develop guidelines for the implementation of the Emergency Medical Services symbol sign.

The State should consider the following guidelines in the preparation of its policy:

A. AMBULANCE

1. 24-hour service, 7 days per week.
2. Staffed by two State-certified persons trained at least to the basic level.
3. Vehicular communications with a hospital emergency department.
4. Operator should have successfully completed an emergency vehicle operator training course.

B. HOSPITAL

1. 24-hour service, 7 days per week.
2. Emergency department facilities with a physician (or emergency care nurse on duty within the emergency department with a physician on call) trained in emergency medical procedures on duty.
3. Licensed or approved for definitive medical care by an appropriate State authority.
4. Equipped for radio voice communications with ambulances and other hospitals.

C. Channel 9 Monitored

1. Provided by either professional or volunteer monitors.
2. Available 24 hours per day, 7 days per week.
3. The service should be endorsed, sponsored, or controlled by an appropriate government authority to guarantee the level of monitoring.

2I.3 General Service Signs for Freeways and Expressways

SUPPORT:

General Service (D9-18 series) signs are generally not appropriate at major interchanges (see definition in Section 2E.32) and in urban areas.

STANDARD:

General Service signs shall have white letters, symbols, arrows, and borders on a blue background. Letter and numeral sizes shall comply with the minimum requirements of Tables 2E-2 through 2E-5. All approved symbols shall be permitted as alternatives to word messages, but symbols and word service messages shall not be intermixed. If the services are not visible from the ramp of a single-exit interchange, the service signing shall be repeated in smaller size at the intersection of the exit ramp and the crossroad. Such service signs shall use arrows to indicate the direction to the services.

OPTION:

For numbered interchanges, the exit number may be incorporated within the sign legend (D9-18b) or displayed on an Exit Number (E1-5P) plaque (see Section 2E.31).

GUIDANCE:

Distance to services should be displayed on General Service signs where distances are more than 1 mile.

General Service signing should only be provided at locations where the road user can return to the freeway or expressway and continue in the same direction of travel.

Only services that fulfill the needs of the road user should be displayed on General Service signs. If State or local agencies elect to provide General Service signing, there should be a statewide policy for such signing and criteria for the availability of the various types of services. The criteria should consider the following:

- A. Gas, Diesel, LP-Gas, EV Charging, and/or other alternative fuels if all of the following are available:
 1. Vehicle services such as gas, oil, and water;
 2. Modern sanitary facilities and drinking water;
 3. Continuous operations at least 16 hours per day, 7 days per week; and
 4. Public telephone.
- B. Food if all of the following are available:
 1. Licensing or approval, where required;
 2. Continuous operation to serve at least two meals per day, at least 6 days per week;
 3. Public telephone; and
 4. Modern sanitary facilities.

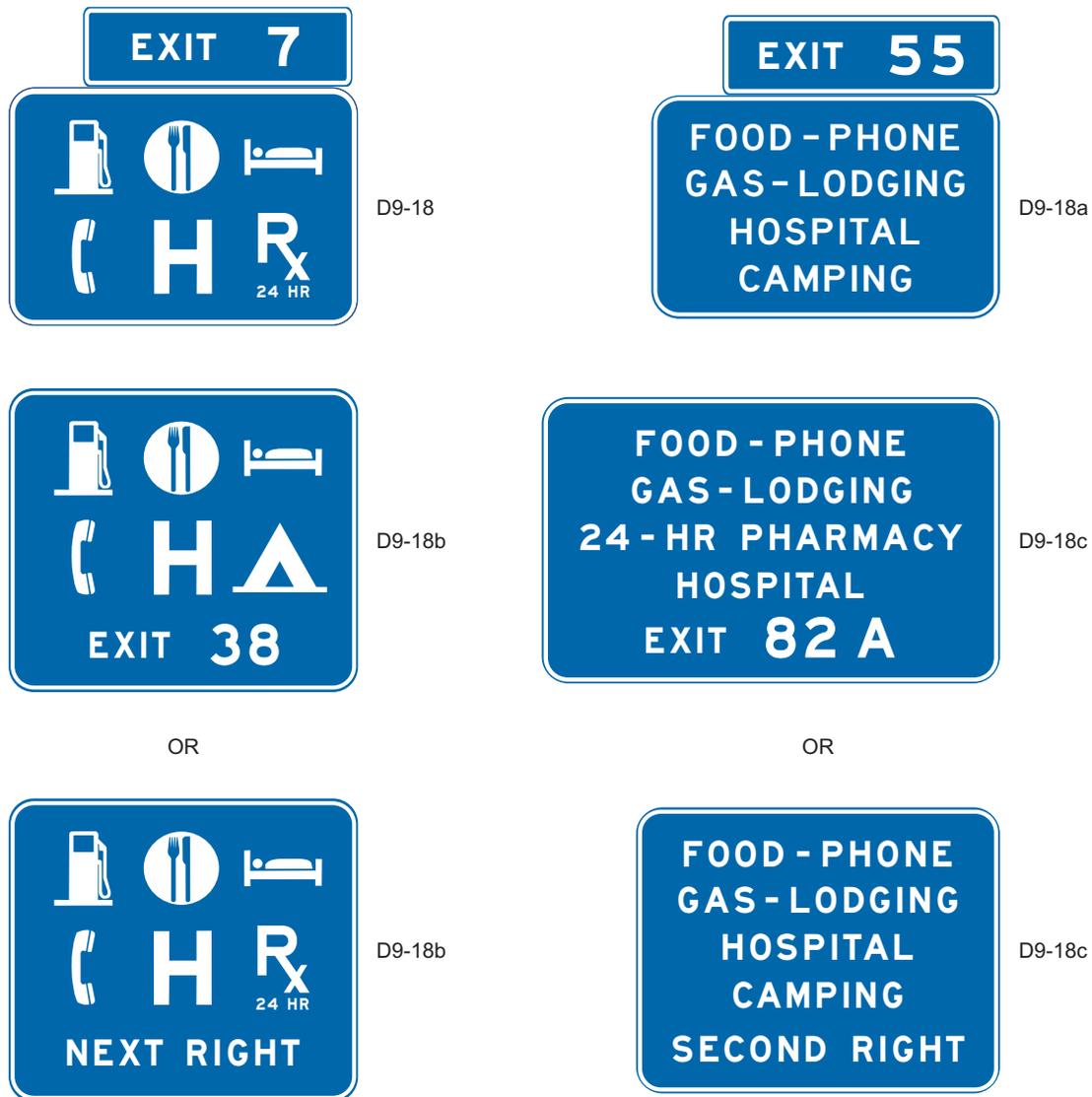


Figure 2I-3. Examples of General Service Signs with and without Exit Numbering

A. If adequate sign spacing allows, a separate Interstate Oasis (D5-12) sign should be installed in an effective location with spacing of at least 800 feet from other adjacent guide signs, including any Specific Service signs. This Interstate Oasis sign should be located upstream from the Advance Guide sign or between the Advance Guide sign and the Exit Direction sign for the exit leading to the Interstate Oasis. The Interstate Oasis sign should have a white legend with a letter height of at least 10 inches and a white border on a blue background and should contain the words INTERSTATE OASIS and the exit number or, for an unnumbered interchange, an action message such as NEXT RIGHT. The names or logos of the businesses designated as Interstate Oases should not be included on this sign.

B. If the spacing of the other guide signs precludes the use of a separate sign as described in Item A, an INTERSTATE OASIS (D5-12P) supplemental plaque with a letter height of at least 10 inches and with a white legend and border on a blue background should be appended above or below an existing D9-18 series General Service sign for the interchange.

If a separate Interstate Oasis (D5-12) sign is installed, an Interstate Oasis sign panel should be incorporated into the design of the sign (see Figure 2I-4).

STANDARD:

The Interstate Oasis sign panel shall only be used on the separate Interstate Oasis sign where it is accompanied by the words INTERSTATE OASIS and shall not be used independently without the words.

OPTION:

If Specific Service signing is provided at the interchange, a business designated as an Interstate Oasis and having a business logo sign panel on the Food and/or Gas Specific Service signs may use the bottom portion of the business logo sign panel to display the word OASIS.

STANDARD:

If Specific Services signs containing the OASIS legend as a part of the business logo(s) are not used on the ramp and if the Interstate Oasis is not clearly visible and identifiable from the exit ramp, a sign with a white INTERSTATE OASIS legend with a letter height of at least 6 inches and a white border on a blue background shall be provided on the exit ramp to indicate the direction and distance to the Interstate Oasis.

If needed, additional trailblazer guide signs shall be used along the crossroad to guide road users to an Interstate Oasis.

2I.5 Rest Area and Other Roadside Area Signs



D5-1



D5-1a



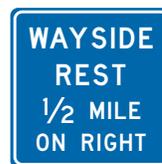
D5-1c



D5-2a



D5-6



D5-X1



D5-X2



D5-X1a



D5-X1b



D5-X1c

STANDARD:

Rest Area signs (see Figure 2I-5) shall have a retroreflective white legend and border on a blue background.

Signs that include the legend REST AREA shall be used only where parking and restroom facilities are available.

GUIDANCE:

A roadside area that does not contain restroom facilities should be signed to indicate the major road user service that is provided. For example, the sign legends for an area with only parking should use the words PARKING AREA instead of REST AREA. The sign legends for an area with only picnic tables and parking should use words such as PICNIC AREA, ROADSIDE TABLE, or ROADSIDE PARK instead of REST AREA.

Rest areas that have tourist information and welcome centers should be signed as discussed in Section 2I.8.

Scenic area signing should be consistent with that provided for rest areas, except that the legends should use words such as SCENIC AREA, SCENIC VIEW, or SCENIC OVERLOOK instead of REST AREA.

STANDARD:

When rest areas or other roadside areas located on certain non-freeway highways are closed during the non-tourist season, a CLOSED plaque or other plaque indicating the periods of operation shall be mounted on the face of the sign(s).

GUIDANCE:

If a rest area or other roadside area is provided on a conventional road, a D5-1 and/or D5-1a sign should be installed in advance of the rest area or other roadside area to permit the driver to reduce speed in preparation for leaving the highway. A D5-5 sign (or a D5-2 sign if an exit ramp is provided) should be installed at the turnoff point where the driver needs to leave the highway to access the rest area or other roadside area.

If a rest area or other roadside area is provided on a freeway or expressway, a D5-1 sign should be placed 1 mile and/or 2 miles in advance of the rest area.

STANDARD:

A D5-2a sign shall be placed at the rest area or other roadside area exit gore.

OPTION:

A D5-1a sign may be placed between the D5-1 sign and the exit gore on a freeway or expressway. A second D5-1 sign may be used in place of the D5-1a sign with a distance to the nearest 1/2 or 1/4 mile displayed as a fraction rather than a decimal for distances of less than 1 mile.

To provide the road user with information on the location of succeeding rest areas, a NEXT REST AREA XX MILES (D5-6) sign may be installed independently or as a supplemental sign mounted below one of the REST AREA advance guide signs.

STANDARD:

All signs on freeways and expressways for rest and other roadside areas shall have letter and numeral sizes that comply with the minimum requirements of Tables 2E-2 through 2E-5. The sizes for General Service signs that have standardized designs shall be as shown in Table 2I-1.

OPTION:

If the rest area has facilities for the physically impaired (see Section 2I.2), the International Symbol of Accessibility for the Handicapped (D9-6) sign may be placed with or beneath the REST AREA advance guide sign.

If telecommunication devices for the deaf (TDD) are available at the rest area, the TDD (D9-21) symbol sign may be used to supplement the advance guide signs for the rest area.

If wireless Internet services are available at the rest area, the Wi-Fi (D9-22) symbol sign may be used to supplement the advance guide signs for the rest area.

2I.5.1 Public Water Access Signs (D7-X7, D7-X7a, and DNR sign)



D7-X7



D7-X7a



DNR sign

OPTION:

The Public Water Access signs may be used to provide direction to a location on a lake, stream or river where a motorist may launch a licensed water craft.

STANDARD:

Public Water Access signs shall have a retroreflective white legend and border on a brown background.

Public Water Access signs shall not be installed unless the necessary Trailblazing signs are in place to provide guidance along the route to the site.

Trailblazing signing on local roads shall be the responsibility of the facility and the local road authority.

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The Minnesota Department of Natural Resources (DNR) Public Water Access sign shall be installed on its own structure. The location of the sign and the design of its structure shall be approved by the appropriate road authority. It shall not obstruct the view of any official traffic control device.

2I.6 Brake Check Area Signs (D5-13 and D5-14)



D5-13



D5-14

GUIDANCE:

If an area has been provided for drivers to check the brakes on their vehicle, a BRAKE CHECK AREA XX MILES (D5-13) sign should be installed in advance of the brake check area, and a D5-14 sign should be placed at the entrance to the brake check area.

2I.7 Chain-Up Area Signs (D5-15 and D5-16)



D5-15



D5-16

GUIDANCE:

If an area has been provided for drivers to pull off of the roadway to install chains on their tires, a CHAIN-UP AREA XX MILES (D5-15) sign should be installed in advance of the chain-up area, and a D5-16 sign should be placed at the entrance to the chain-up area.

2I.8 Tourist Information and Welcome Center Signs



D5-7a



D5-7b



D5-11

Note: Alternate legends may be substituted for the TOURIST INFO CENTER legend, such as WELCOME CENTER and (State Name) WELCOME CENTER.

SUPPORT:

Tourist information and welcome centers have been constructed within rest areas on freeways and expressways and are operated by either a State or a private organization. Others have been located within close proximity to these facilities and operated by civic clubs, chambers of commerce, or private enterprise.

GUIDANCE:

An excessive number of supplemental sign panels should not be installed with Tourist Information or Welcome Center signs so as not to overload the road user.

STANDARD:

Tourist Information or Welcome Center signs shall have a white legend and border on a blue background. Continuously staffed or unstaffed operation at least 8 hours per day, 7 days per week, shall be required.

If operated only on a seasonal basis, the Tourist Information or Welcome Center signs shall be removed or covered during the off seasons.

GUIDANCE:

For freeway or expressway rest area locations that also serve as tourist information or welcome centers, the following signing criteria should be used:

- A. The locations for tourist information and welcome center Advance Guide, Exit Direction, and Exit Gore signs should meet the General Service signing requirements described in Section 2I.3.
- B. If the signing for the tourist information or welcome center is to be accomplished in conjunction with the initial signing for the rest areas, the message on the Advance Guide (D5-7) sign should be REST AREA, TOURIST INFO CENTER, XX MILES or REST AREA, STATE NAME (optional), WELCOME CENTER XX MILES. On the Exit Direction (D5-8 or D5-11) sign the message should be REST AREA, TOURIST INFO CENTER with a diagonally upward-pointing directional arrow (or NEXT RIGHT), or REST AREA, STATE NAME (optional), WELCOME CENTER with a diagonally upward-pointing directional arrow (or NEXT RIGHT).

- C. If the initial rest area Advance Guide and Exit Direction signing is in place, these signs should include, on supplemental signs, the legend TOURIST INFO CENTER or STATE NAME (optional), WELCOME CENTER.
- D. The Exit Gore sign should contain only the legend REST AREA with the arrow and should not be supplemented with any legend pertaining to the tourist information center or welcome center.

OPTION:

An alternative to the supplemental TOURIST INFO CENTER legend is the Tourist Information (D9-10) sign, which may be appended beneath the REST AREA advance guide sign.

The name of the State or local jurisdiction may appear on the Advance Guide and Exit Direction tourist information/welcome center signs if the jurisdiction controls the operation of the tourist information or welcome center and the center meets the operating criteria set forth in this Manual and is consistent with State policies.

GUIDANCE:

For tourist information centers that are located off the freeway or expressway facility, additional signing criteria should be as follows:

- A. Each State should adopt a policy establishing the maximum distance that a tourist information center can be located from the interchange in order to be included on official signs.
- B. The location of signing should be in accordance with requirements pertaining to General Service signing (see Section 2I.3).
- C. Signing along the crossroad should be installed to guide the road user from the interchange to the tourist information center and back to the interchange.

OPTION:

As an alternative, the Tourist Information (D9-10) sign may be appended to the guide signs for the exit that provides access to the tourist information center. As a second alternative, the Tourist Information sign may be combined with General Service signing.

2I.9 Radio Information Signing



D12-1

OPTION:

Radio-Weather Information (D12-1) signs may be used in areas where difficult driving conditions commonly result from weather systems. Radio-Traffic Information signs may be used in conjunction with traffic management systems.

STANDARD:

Radio-Weather and Radio-Traffic Information signs shall have a white legend and border on a blue background. Only the numerical indication of the radio frequency shall be used to identify a station broadcasting travel-related weather or traffic information. No more than three frequencies shall be displayed on each sign. Only radio stations whose signal will be of value to the road user and who agree to broadcast either of the following two items shall be identified on Radio-Weather and Radio-Traffic Information signs:

- A. Periodic weather warnings at a rate of at least once every 15 minutes during periods of adverse weather; or
- B. Driving condition information (affecting the roadway being traveled) at a rate of at least once every 15 minutes, or when required, during periods of adverse traffic conditions, and when supplied by an official agency having jurisdiction.

If a station to be considered operates only on a seasonal basis, its signs shall be removed or covered during the off season.

GUIDANCE:

The radio station should have a signal strength to adequately broadcast 70 miles along the route. Signs should be spaced as needed for each direction of travel at distances determined by an engineering study. The stations to be included on the signs should be selected in cooperation with the association(s) representing major broadcasting stations in the area to provide: (1) maximum coverage to all road users on both AM and FM frequencies; and (2) consideration of 24 hours per day, 7 days per week broadcast capability.

OPTION:

In roadway rest area locations, a smaller sign using a greater number of radio frequencies, but of the same general design, may be used.

STANDARD:

Radio-Weather and Radio-Traffic Information signs installed in rest areas shall be positioned such that they are not visible from the main roadway.



D12-3



D12-4

OPTION:

A Channel 9 Monitored (D12-3) sign may be installed as needed. Official public agencies or their designees may be displayed as the monitoring agency on the sign.

STANDARD:

Only official public agencies or their designee shall be displayed as the monitoring agency on the Channel 9 Monitored sign.

OPTION:

An Emergency CALL XX (D12-4) sign, along with the appropriate number to call, may be used for cellular phone communications.

2I.10 TRAVEL INFO CALL 511 Signs (D12-5 and D12-5a)



D12-5



D12-5a

OPTION:

A TRAVEL INFO CALL 511 (D12-5) sign may be installed if a 511 travel information services telephone number is available to road users for obtaining traffic, public transportation, weather, construction, or road condition information.

The pictograph of the transportation agency or the travel information service or program that is providing the travel information may be incorporated within the D12-5 sign either above or below the TRAVEL INFO CALL 511 legend.

STANDARD:

The logo of a commercial entity shall not be incorporated within the TRAVEL INFO CALL 511 sign.

The TRAVEL INFO CALL 511 sign shall have a white legend and border on a blue background.

GUIDANCE:

If the pictograph of the transportation agency or the travel information service or program is used, the pictograph's maximum height should not exceed two times the letter height used in the legend of the sign.

2I.11 Carpool and Ridesharing Signing (D12-2a, and D12-2b)



D12-2a



D12-2b

OPTION:

In areas having carpool matching services, Carpool Information (D12-2) signs may be provided adjacent to highways with preferential lanes or along any other highway.

Carpool Information signs may include an Internet domain name or telephone number of more than four characters within the legend.

GUIDANCE:

Because this is an information sign related to road user services, the Carpool Information sign should have a white legend and border on a blue background.

STANDARD:

If a local transit pictograph or carpool symbol is incorporated into the Carpool Information sign, the maximum vertical dimension of the logo or symbol shall not exceed 18 inches.

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Type of Sign	Freeway	Ramp
A. Specific Service Signs		
Service Categories	10	6
Exit Number Words	10	--
Exit Number Numerals and Letters	10	--
Action Message Words	10	6
Distance Numerals	--	6
Distance Fraction Numerals	--	4
B. Logo Sign Panels		
Logo Sign Panels	60 x 36	30 x 18
Words and Numerals (Non-Trademark/Graphic Logos)	8	4
Trademark/Graphic Logos	Proportional	Proportional
Supplemental Message Words and Numerals	5	2.5

Table 2J-1 Minimum Letter and Numeral Sizes for Logo Signs According to Sign Type

STANDARD:

All supplemental messages shall be displayed within the logo sign panel and shall have letters and numerals that comply with the minimum height requirements shown in Table 2J-1.

GUIDANCE:

A logo sign panel should not display more than one supplemental message.

The supplemental message should be displayed in a color to contrast effectively with the background of the business sign or separated from the other legend or logo by a divider bar.

SUPPORT:

Typical supplemental messages might include DIESEL, 24 HOURS, CLOSED and the day of the week when the facility is closed, ALTERNATIVE FUELS (see Section 2I.3), and RV ACCESS.

OPTION:

The RV ACCESS supplemental message may be circular.

STANDARD:

If the RV ACCESS supplemental message is circular, it shall be the abbreviation RV in black letters inside a yellow circle with a black border and it shall be displayed within the logo sign panel near the lower right-hand corner (see Figure 2J-4).

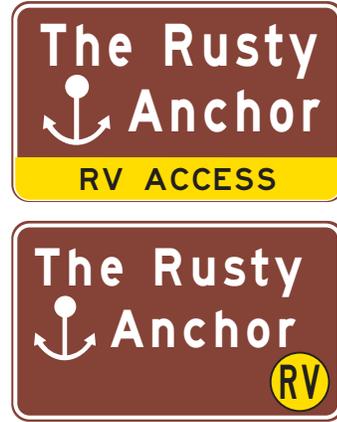


Figure 2J-4 Examples of RV Access Supplemental Messages on Logo Sign Panels

GUIDANCE:

If the circular RV ACCESS supplemental message is used, the circle should have a diameter of 10 inches and the letters should have a height of 6 inches.

If a State or local agency elects to display the designation of businesses as providing on-premise accommodations for recreational vehicles with the RV ACCESS supplemental message or the RV Access circular message, there should be a statewide policy for such designation and criteria for qualifying businesses. The criteria should include such site conditions as access between the public roadway and the site, on-premise geometry, and parking.

STANDARD:

A logo sign panel shall not display the symbol/trademark or name of more than one business.

2J.4 Number and Size of Signs and Logo Sign Panels

GUIDANCE:

Sign sizes should be determined by the amount and height of legend and the number and size of logo sign panels attached to the sign. All logo sign panels on a sign should be the same size.

STANDARD:

Each Logo sign or sign assembly shall be limited to no more than six logo sign panels.

OPTION:

Where more than six businesses of a service type are eligible for logo sign panels at the same interchange, additional logo sign panels of that same service type may also be displayed in accordance with the provisions of the following Standard. The additional logo sign panels may be displayed either by placing more than one service type on the same sign (see Paragraph 3 of the Standard in Section 2J.2) or by using a second Logo sign of that service type if the additional sign can be added without exceeding the limit of four Logo signs at an interchange approach (see Guidance in Section 2J.2).

STANDARD:

Where logo sign panels for more than six businesses of a service type are displayed at the same interchange or intersection approach, the following provisions shall apply:

- No more than 12 logo sign panels of a service type shall be displayed on no more than two Logo signs or sign assemblies;
- No more than six logo sign panels shall be displayed on a single Logo sign; and
- No more than four Logo signs shall be displayed on the approach.

SUPPORT:

Section 2J.8 contains information regarding Logo signs for double-exit interchanges.

STANDARD:

Each logo sign panel attached to a Logo sign shall have a rectangular shape with a width longer than the height. A logo sign panel on signs for freeways and expressways shall not exceed 60 inches in width and 36 inches in height. A logo sign panel on signs for freeway and expressway ramps shall not exceed 30 inches in width and 18 inches in height. The vertical and horizontal spacing between logo sign panels shall not exceed 8 inches and 12 inches, respectively.

SUPPORT:

Sections 2A.14, 2E.15, and 2E.16 contain information regarding borders, interline spacing, and edge spacing.

2J.5 Size of Lettering**STANDARD:**

All Logo signs and logo sign panels shall have letter and numeral sizes that comply with the minimum requirements of Table 2J-1.

GUIDANCE:

Any legend on a symbol/trademark should be proportional to the size of the symbol/trademark.

2J.6 Signs at Interchanges**STANDARD:**

The Logo signs shall be installed between the preceding interchange and at least 800 feet in advance of the Exit Direction sign at the interchange from which the services are available (see Figure 2J-2).

GUIDANCE:

There should be at least an 800 foot spacing between the Logo signs, except for Logo ramp signs. However, excessive spacing is not desirable. Logo ramp signs should be spaced at least 100 feet from the exit gore sign, from each other, and from the ramp terminal.

2J.7 Single-Exit Interchanges**STANDARD:**

At numbered single-exit interchanges, the name of the service type followed by the exit number shall be displayed on one line above the logo sign panels. At unnumbered interchanges, the directional legend NEXT RIGHT (LEFT) shall be used.

At single-exit interchanges, Logo ramp signs shall be installed along the ramp or at the ramp terminal for facilities that have logo sign panels displayed along the main roadway if the facilities are not readily visible from the ramp terminal. Directions to the service facilities shall be indicated by arrows on the ramp signs. Logo sign panels on Logo ramp signs shall be duplicates of those displayed on the Logo signs located in advance of the interchange, but shall be reduced in size (see the third Standard of Section 2J.4).

GUIDANCE:

Logo ramp signs should include distances to the service facilities.

OPTION:

An exit number plaque (see Section 2E.31) may be used instead of the exit number on the signs located in advance of an interchange.

PART 2. SIGNS

Chapter 2M. Recreational and Cultural Interest Area Signs

2M.1 Scope

SUPPORT:

Recreational or cultural interest areas are attractions or traffic generators that are open to the general public for the purpose of play, amusement, or relaxation. Recreational attractions include such facilities as parks, campgrounds, gaming facilities, and ski areas, while examples of cultural attractions include museums, art galleries, and historical buildings or sites.

The purpose of recreation and cultural interest area signs is to guide road users to a general area and then to specific facilities or activities within the area.

OPTION:

Recreational and cultural interest area guide signs directing road users to significant traffic generators may be used on freeways and expressways where there is direct access to these areas as provided in Section 2M.9.

Recreational and cultural interest area signs may be used off the road network, as appropriate.

2M.2 Application of Recreational and Cultural Interest Area Signs

SUPPORT:

Provisions for signing recreational or cultural interest areas are subdivided into two different types of signs: (1) symbol signs and (2) destination guide signs.

GUIDANCE:

When highway agencies decide to provide recreational and cultural interest area signing, these agencies should have a policy for such signing. The policy should establish signing criteria for the eligibility of the various types of services, accommodations, and facilities. These signs should not be used where they might be confused with other traffic control signs.

OPTION:

Recreational and cultural interest area guide signs may be used on any road to direct persons to facilities, structures, and places, and to identify various services available to the general public. These guide signs may also be used in recreational or cultural interest areas for signing non-vehicular

events and amenities such as trails, structures, and facilities.

SUPPORT:

Section 2A.12 contains information regarding the use of recreational and cultural interest area symbols on other types of signs.

2M.3 Regulatory and Warning Signs

STANDARD:

All regulatory and warning signs installed on public roads and streets within recreational and cultural interest areas shall comply with the requirements of Chapters 2A, 2B, 2C, 7B, 8B, and 9B.

2M.4 General Design Requirements for Recreational and Cultural Interest Area Symbol Signs

STANDARD:

Recreational and cultural interest area symbol guide signs shall be square or rectangular in shape and shall have a white symbol or message and white border on a brown background. The symbols shall be grouped into the following usage and series categories:

- A. General Applications,
- B. Accommodations,
- C. Services,
- D. Land Recreation,
- E. Water Recreation, and
- F. Winter Recreation.

SUPPORT:

Table 2M-1 contains a listing of the symbols within each series category. Drawings showing the design details for these symbols are found in the Federal "Standard Highway Signs and Markings" book (see Section 1A.11).

OPTION:

Mirror images of symbols may be used where the reverse image will better convey the message.

General	
Bear Viewing Area	RS-012
Bus Stop	RS-031
Campfires *	RS-042
Cans or Bottles *	RS-101
Cultural Interest Area	RS-142
Dam	RS-009
Deer Viewing Area	RS-011
Falling Rocks *	RS-008
Fire Extinguisher *	RS-090
Lighthouse	RS-007
Lookout Tower	RS-006
Nature Study Area	RS-141
Pets on Leash *	RS-017
Pick-Up Trucks	RS-140
Point of Interest	RS-080
Radios *	RS-103
Rattlesnakes *	RS-099
Recycling *	RS-200
Sea Plane	RS-115
Smoking *	RS-002
Snack Bar *	RS-102
Stay on Trail *	RS-123
Strollers *	RS-111
Tunnel	RS-005
Viewing Area	RS-036
Walk on Boardwalk *	RS-122
Wood Gathering *	RS-120

Accommodations	
Baby Changing Station (Men's Room)	RS-137
Baby Changing Station (Women's Room)	RS-138
Men's Restroom	RS-021
Parking	RS-034
Recreational Vehicle Site	RS-104
Restrooms	RS-022
Sleeping Shelter *	RS-037
Trailer Site	RS-040
Walk-In Camp	RS-148
Women's Restroom	RS-023

Services	
Drinking Water	RS-013
Electrical Hook-Up	RS-150
Firewood Cutting *	RS-112
First Aid	RS-024
Grocery Store	RS-020
Kennel	RS-045
Laundromat	RS-085
Litter Receptacle	RS-086
Lockers/Storage *	RS-030
Mechanic	RS-027
Picnic Shelter	RS-039
Picnic Site	RS-044
Post Office	RS-026
Radiator Water	RS-114
Ranger Station	RS-015
Sanitary Station	RS-041
Showers *	RS-035
Stable	RS-073
Theater	RS-109
Trail Shelter *	RS-043
Tramway	RS-071
Trash Dumpster	RS-091

Land Recreation	
All Terrain Trail	RS-095
Amphitheater	RS-070
Archery	RS-116
Baseball *	RS-096
Climbing *	RS-082
Corral	RS-149
Driving Tour	RS-113
Exercise/Fitness	RS-097
Golfing *	RS-128
Hang Gliding	RS-126
Hiking Trail	RS-068
Horse Trail	RS-064
In-Line Skating	RS-125
Interpretive Trail	RS-114
Off-Road Vehicle Trail	RS-067
Rock Collecting *	RS-063
Skateboarding *	RS-098
Spelunking/Caves	RS-084
Technical Rock Climbing	RS-081
Tennis	RS-129
Wildlife Viewing	RS-076

Water Recreation	
Beach	RS-012
Boat Motor	RS-147
Boat Ramp	RS-054
Canoeing	RS-079
Diving	RS-062
Fish Cleaning *	RS-093
Fish Hatchery	RS-010
Fish Ladder *	RS-089
Fishing Area	RS-063
Fishing Pier	RS-119
Hand Launch/Small Boat Launch	RS-117
Jet Ski/Personal Watercraft	RS-121
Kayaking	RS-118
Lifejackets *	RS-094
Marina	RS-053
Motorboating	RS-055
Rafting	RS-146
Rowboating	RS-057
Sailing	RS-056
Scuba Diving	RS-060
Seal Viewing	RS-106
Surfing	RS-059
Swimming	RS-061
Tour Boat	RS-087
Wading	RS-088
Waterskiing	RS-058
Whale Viewing	RS-107
Wind Surfing	RS-108

Winter Recreation	
Chair Lift/Ski Lift	RS-105
Cross Country Skiing	RS-046
Dog Sledding	RS-143
Downhill Skiing	RS-047
Ice Fishing	RS-092
Ice Skating	RS-050
Ski Jumping	RS-048
Sledding	RS-049
Snow Tubing	RS-144
Snowboarding	RS-127
Snowmobiling	RS-052
Snowshoeing	RS-078
Winter Recreational Area	RS-077

* For non-road use only

Table 2M-1 Category Chart for Recreational and Cultural Interest Area Symbols

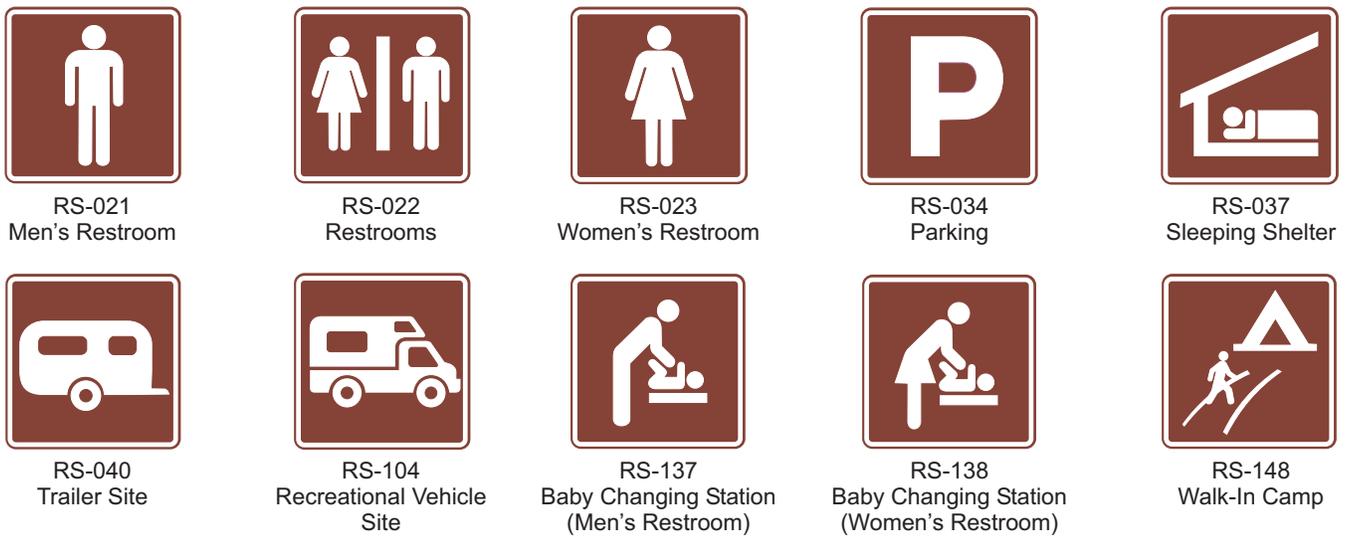


Figure 2M-6. Recreational and Cultural Interest Area Symbol Signs for Accommodation



Figure 2M-7. Recreational and Cultural Interest Area Symbol Signs for Services



Figure 2M-8. Recreational and Cultural Interest Area Symbol Signs for Land Recreation



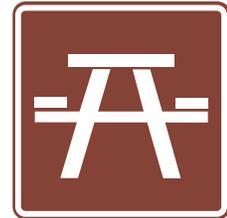
D7-X8a
Carry-in Access



RS-100
Information



RS-010
Campground



RS-044
Picnic Area



RS-082
Rock Climbing



RS-090
Bicycle Trail



RS-068
Hiking Trail



RS-064
Horse Trail



RS-128
Golf Course



RS-07920
Canoeing



RS-054
Boat Launch



RS-061
Swimming



RS-046
Cross Country Skiing



RS-052
Snowmobiling



RS-078
Snowshoeing

Figure 2M-12 Symbol Signs Approved for Placement Below a Recreational or Cultural Interest Area Guide Sign

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Chapter 2N. EMERGENCY MANAGEMENT SIGNING

2N.1 Emergency Management

GUIDANCE:

Contingency planning for an emergency evacuation should be considered by all State and local jurisdictions and should consider the use of all applicable roadways.

In the event of a disaster where highways that cannot be used will be closed, a successful contingency plan should account for the following elements: a controlled operation of certain designated highways, the establishment of traffic operations for the expediting of essential traffic, and the provision of emergency centers for civilian aid.

2N.2 Design of Emergency Management Signs

STANDARD:

Emergency Management signs shall be used to guide and control highway traffic during an emergency.

Emergency Management signs shall not permanently displace any of the standard signs that are normally applicable.

Advance planning for transportation operations' emergencies shall be the responsibility of State and local authorities. The Federal Government shall provide guidance to the States as necessitated by changing circumstances.

Except as provided in Section 2A.11, the sizes for Emergency Management signs shall be as shown in Table

2N-1 and Appendix C of this Manual.

SUPPORT:

Section 2A.11 contains information regarding the applicability of the various columns in Table 2N-1.

OPTION:

Signs larger than those shown in Table 2N-1 may be used (see Section 2A.11).

GUIDANCE:

As conditions permit, the Emergency Management signs should be replaced or augmented by standard signs.

The background of Emergency Management signs should be retroreflective.

Because Emergency Management signs might be needed in large numbers for temporary use during an emergency, consideration should be given to their fabrication from any light and economical material that can serve through the emergency period.

OPTION:

Any Emergency Management sign that is used to mark an area that is contaminated by biological or chemical warfare agents or radioactive fallout may be accompanied by the standard symbol that is illustrated in the upper left corner of the EM-7c and EM-7d signs.

Sign or Plaque	Sign Designation	Section	Minimum Size
Evacuation Route	EM-1, EM-1a	2N.3	24 x 24*
Area Closed	EM-2	2N.4	30 x 24
Traffic Control Point	EM-3	2N.5	30 x 24
Maintain Top Safe Speed	EM-4	2N.6	24 x 30
Permit Required	EM-5	2N.7	24 x 30
Emergency Aid Center	EM-6a to EM-6d	2N.8	30 x 24
Shelter Directional	EM-7a to EM-7d	2N.9	30 x 24

* The minimum size of 18 x 18 may be used on low-volume roadways or roadways with speeds of 25 mph or less.

- Notes: 1. Larger signs may be used when appropriate
2. Dimensions in inches are shown as width x height

Table 2N-1. Emergency Management Sign Sizes

2N.3 Evacuation Route Signs (EM-1 and EM-1a)



EM-1



EM-1a

STANDARD:

The Evacuation Route (EM-1 and EM-1a) signs shall display a blue circular symbol on a white square sign without a border as shown in Figure 2N-1. The EM-1 sign shall include a white directional arrow (except as provided in the following Option) and a white legend EVACUATION ROUTE within the blue circular symbol. The EM-1a sign shall include a white EVACUATION ROUTE legend and the tsunami symbol within the blue circular symbol. The EM-1 and EM-1a signs shall be retroreflective.

An Advance Turn Arrow (M5 series) or Directional Arrow (M6 series) auxiliary sign as shown in Figure 2D-5, but with a white arrow on a blue background instead of a black arrow on a white background, shall be installed below the EM-1a sign.

OPTION:

Instead of including a directional arrow within the blue circular symbol on the EM-1 sign, an Advance Turn Arrow (M5 series) or Directional Arrow (M6 series) auxiliary sign as shown in Sections 2D.26 and 2D.28, but with a white arrow on a blue background instead of a black arrow on a white background, may be installed below the EM-1 sign.

If desired, the word HURRICANE, or a word that describes some other type of evacuation route, may be added as a third line of text above the white EVACUATION ROUTE legend within the blue circular symbol on the EM-1 sign.

An approved Emergency Management symbol with a diameter of 3.5 inches may appear near the bottom of an Evacuation Route sign.

STANDARD:

The arrow designs, if used, on the EM-1 sign shall include a straight, vertical arrow pointing upward, a straight horizontal arrow pointing to the left or right, or a bent arrow pointing to the left or right for advance warning of a turn.

If used in urban areas, the Evacuation Route sign shall be mounted at the right-hand side of the roadway, not less than 7 feet above the top of the curb, and at least 1 foot back from the face of the curb. If used in rural areas, the Evacuation Route sign shall be mounted at the right-hand side of the roadway, not less than 7 feet above the pavement and not less than 6 feet or more than 10 feet to the right of the right-hand roadway edge.

Evacuation Route signs shall not be placed where they will conflict with other signs. Where conflict in placement would occur between the Evacuation Route sign and a standard regulatory sign, the regulatory sign shall take precedence.

OPTION:

In case of conflict with guide or warning signs, the Evacuation Route sign may take precedence.

GUIDANCE:

Placement of EVACUATION ROUTE signs should be made under the supervision of the officials having jurisdiction over the placement of other traffic signs. Coordination with Emergency Management authorities and agreement between contiguous political entities should occur to assure continuity of routes.

2N.4 AREA CLOSED Sign (EM-2)



EM-2

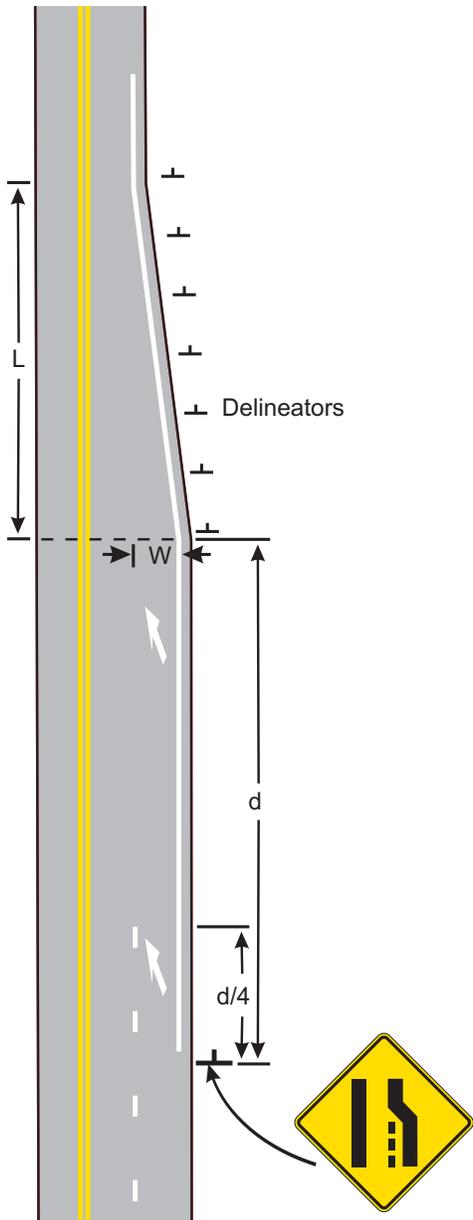
STANDARD:

The AREA CLOSED (EM-2) sign shall be used to close a roadway in order to prohibit traffic from entering the area. It shall be installed on the shoulder as near as practical to the right-hand edge of the roadway, or preferably, on a portable mounting or barricade partly or entirely in the roadway.

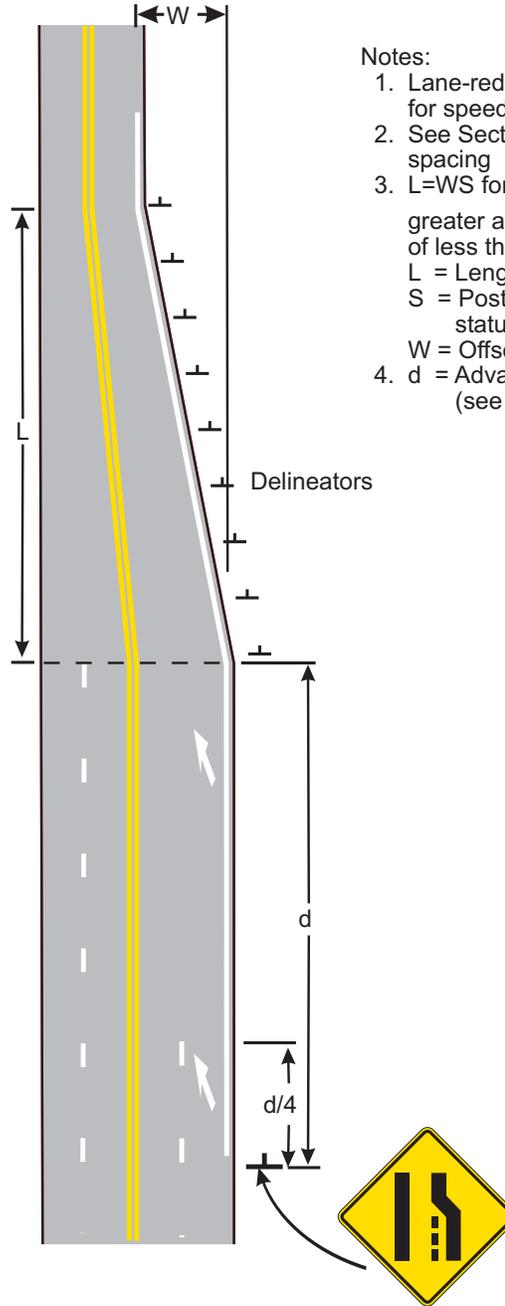
GUIDANCE:

For best visibility, particularly at night, the sign height should not exceed 4 feet measured vertically from the pavement to the bottom of the sign. Unless adequate advance warning signs are used, it should not be placed to create a complete and unavoidable blocked route. Where feasible, the sign should be located at an intersection that provides a detour route.

A - Lane reduction



B - Lane reduction with lateral shift to the left

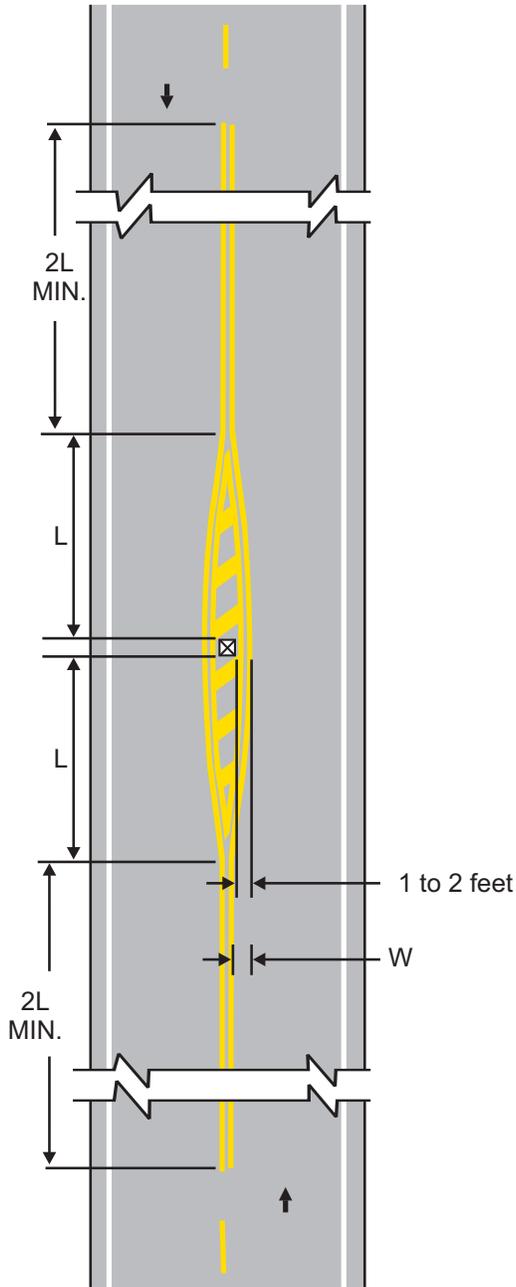


- Notes:
1. Lane-reduction arrows are optional for speeds of less than 45 mph
 2. See Section 3F.4 for delineator spacing
 3. $L=WS$ for speeds of 45 mph or greater and $L= WS^2/60$ for speeds of less than 45 mph, where:
 L = Length of taper in feet
 S = Posted, 85th-percentile, or statutory speed in mph
 W = Offset in feet
 4. d = Advance warning distance (see Section 2C.5)

MN Rev. 1

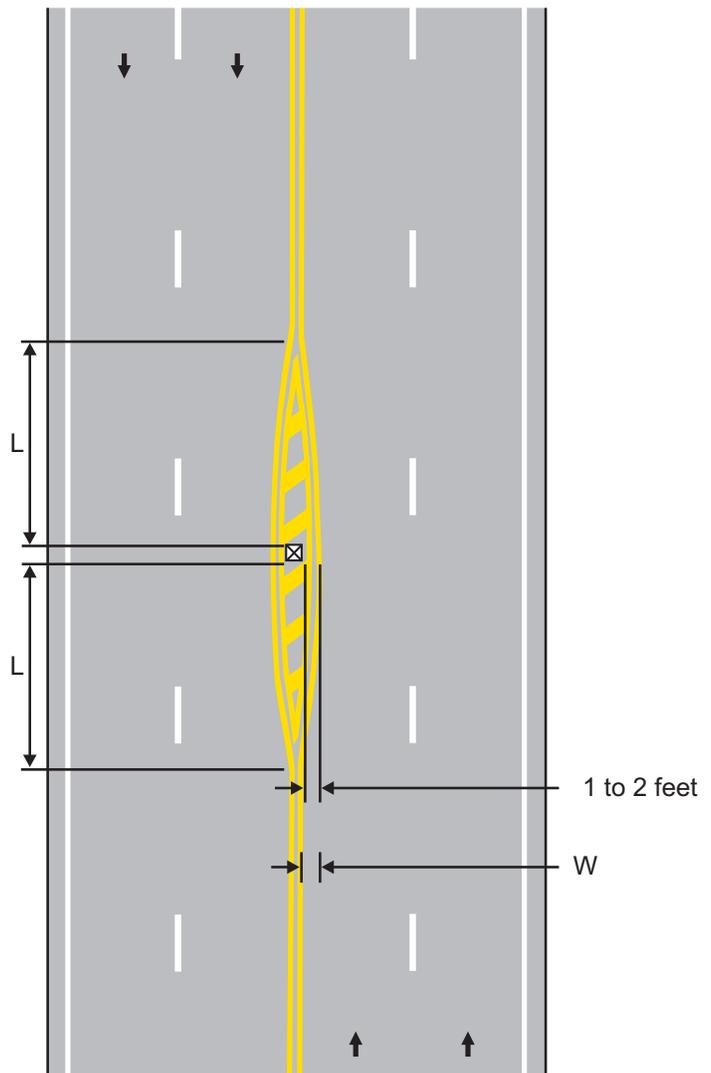
Figure 3B-14 Examples of Applications of Lane-Reduction Transition Markings

A - Center of two-lane road



- Legend**
 → Direction of travel
 ⊠ Obstruction

B - Center of four-lane road



Notes:

- For speeds of 45 mph or greater: $L=WS$
- For speeds less than 45 mph: $L= WS^2/60$
- S = Posted, 85th-percentile, or statutory speed in mph
- W = Offset distance in feet

Minimum length of: L = 100 feet in urban areas
 L = 200 feet in rural areas

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

Figure 3B-15 Examples of Applications of Markings for Obstructions in the Roadway

(Sheet 1 of 2)

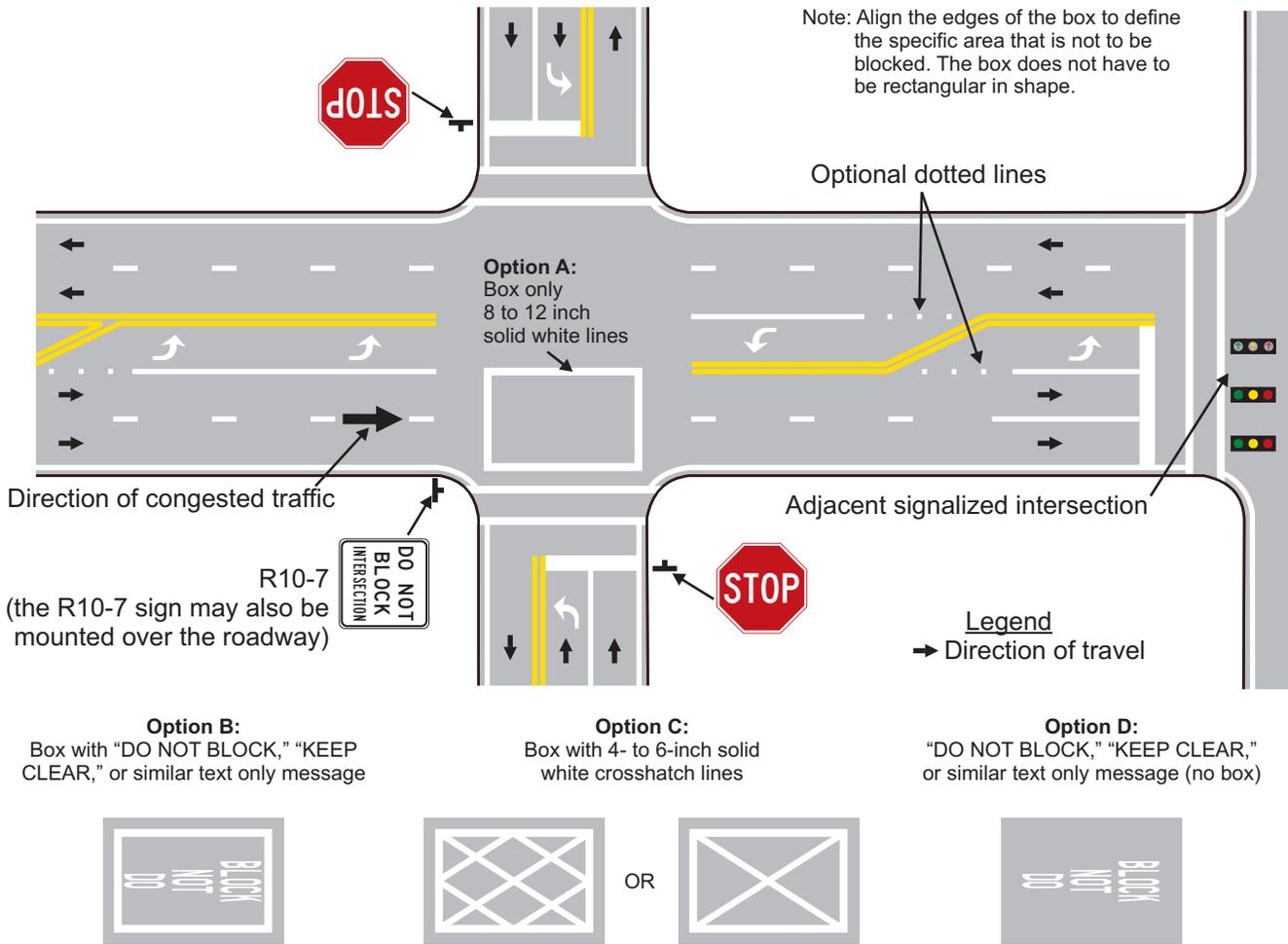


Figure 3B-18 Do Not Block Intersection Markings

At non-intersection locations, crosswalk markings legally establish the crosswalk.

STANDARD:

When crosswalk lines are used, they shall consist of solid white lines that mark the crosswalk. They shall not be less than 6 inches or greater than 24 inches in width.

GUIDANCE:

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

Crosswalk lines, if used on both sides of the crosswalk, should extend across the full width of pavement to the edge of the intersecting crosswalk to discourage diagonal walking between crosswalks (see Figure 3B-17 and 3B-19).

At locations controlled by traffic control signals or on approaches controlled by STOP or YIELD signs, crosswalk lines should be installed where engineering judgment indicates they are needed to direct pedestrians to the proper crossing path(s).

Crosswalk lines should not be used indiscriminately. An engineering study should be performed before a marked crosswalk is installed at a location away from a traffic control signal or an approach controlled by a STOP or YIELD sign. The engineering study should consider the number of lanes, the presence of a median, the distance from adjacent signalized intersections, the pedestrian volumes

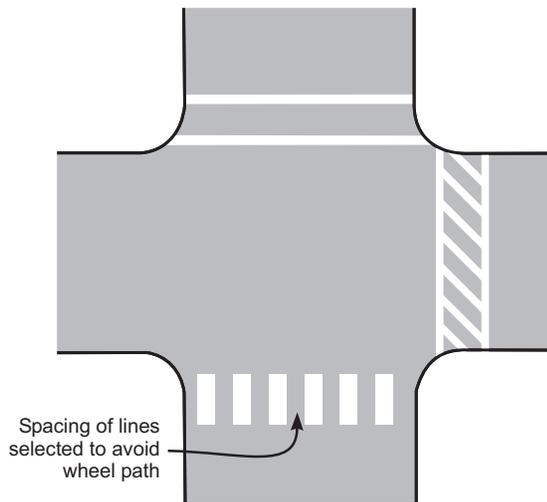


Figure 3B-19 Examples of Crosswalk Markings

and delays, the average daily traffic (ADT), the posted or statutory speed limit or 85th-percentile speed, the geometry of the location, the possible consolidation of multiple crossing points, the availability of street lighting, and other appropriate factors.

New marked crosswalks alone, without other measures designed to reduce traffic speeds, shorten crossing distances, enhance driver awareness of the crossing, and/or provide active warning of pedestrian presence, should not be installed across uncontrolled roadways where the speed limit exceeds 40 mph and either:

- A. The roadway has four or more lanes of travel without a raised median or pedestrian refuge island and an ADT of 12,000 vehicles per day or greater; or
- B. The roadway has four or more lanes of travel with a raised median or pedestrian refuge island and an ADT of 15,000 vehicles per day or greater.

SUPPORT:

Chapter 4F contains information on Pedestrian Hybrid Beacons. Section 4L.3 contains information regarding Warning Beacons to provide active warning of a pedestrian's presence. Section 4N.2 contains information regarding In-Roadway Warning Lights at crosswalks. Chapter 7D contains information regarding school crossing supervision.

GUIDANCE:

Because non-intersection pedestrian crossings are generally unexpected by the road user, warning signs (see Section 2C.50) should be installed for all marked crosswalks at non-intersection locations and adequate visibility should be provided by parking prohibitions.

SUPPORT:

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

OPTION:

For added visibility, the area of the crosswalk may be marked with white diagonal lines at a 45-degree angle to the line of the crosswalk or with white longitudinal lines parallel to traffic flow as shown in Figure 3B-19.

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

GUIDANCE:

If used, the diagonal or longitudinal lines should be 12 to 24 inches wide and separated by gaps of 12 to 60 inches. The design of the lines and gaps should avoid the wheel paths if possible, and the gap between the lines should not exceed 2.5 times the width of the diagonal or longitudinal lines.

OPTION:

When an exclusive pedestrian phase that permits diagonal crossing is provided at a traffic control signal, a marking as shown in Figure 3B-20 may be used for the crosswalk.

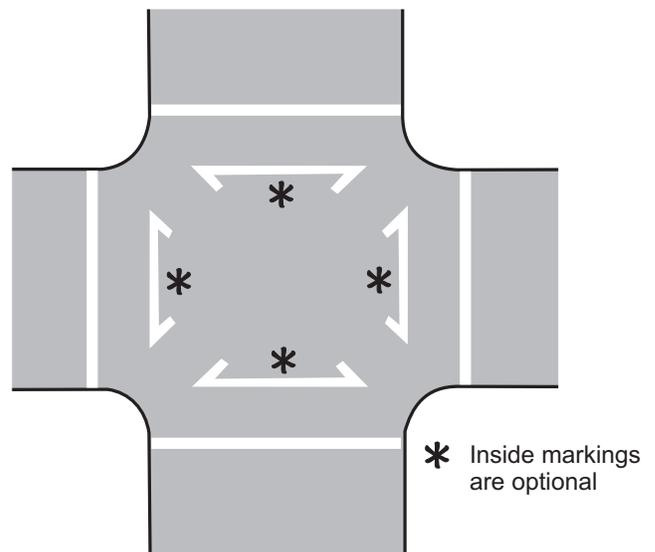


Figure 3B-20 Examples of Crosswalk Markings for an Exclusive Pedestrian Phase That Permits Diagonal Crossing

PART 4. HIGHWAY TRAFFIC SIGNALS

Chapter 4D. Traffic Control Signal Features

4D.1 General

SUPPORT:

The features of traffic control signals of interest to road users are the location, design, and meaning of the signal indications. Uniformity in the design features that affect the traffic to be controlled, as set forth in this Manual, is especially important for the safety and efficiency of operations.

Traffic control signals can be operated in pretimed, semi-actuated, or full-actuated modes. For isolated (non-interconnected) signalized locations on rural high-speed highways, full-actuated mode with advance vehicle detection on the high-speed approaches is typically used. These features are designed to reduce the frequency with which the onset of the yellow change interval is displayed when high-speed approaching vehicles are in the "dilemma zone" such that the drivers of these high-speed vehicles find it difficult to decide whether to stop or proceed.

STANDARD:

When a traffic control signal is not in operation, such as before it is placed in service, during seasonal shutdowns, or when it is not desirable to operate the traffic control signal, the signal faces shall be covered, turned, or taken down to clearly indicate that the traffic control signal is not in operation.

SUPPORT:

Seasonal shutdown is a condition in which a permanent traffic signal is turned off or otherwise made non-operational during a particular season when its operation is not justified. This might be applied in a community where tourist traffic during most of the year justifies the permanent signalization, but a seasonal shutdown of the signal during an annual period of lower tourist traffic would reduce delays; or where a major traffic generator, such as a large factory, justifies the permanent signalization, but the large factory is shut down for an annual factory vacation for a few weeks in the summer.

STANDARD:

A traffic control signal shall control traffic only at the intersection or mid-block location where the signal faces are placed.

Mid-block crosswalks shall not be signalized if they are located within 300 feet from the nearest traffic control signal, unless the proposed traffic control signal will not restrict the progressive movement of traffic.

GUIDANCE:

A mid-block crosswalks should not be signalized if they are located within 100 feet from side streets or driveways that are controlled by STOP signs or YIELD signs.

Engineering judgment should be used to determine the proper phasing and timing for a traffic control signal. Since traffic flows and patterns change, phasing and timing should be reevaluated regularly and updated if needed.

Traffic control signals within 1/2 mile of one another along a major route or in a network of intersecting major routes should be coordinated, preferably with interconnected controller units. Where traffic control signals that are within 1/2 mile of one another along a major route have a jurisdictional boundary or a boundary between different signal systems between them, coordination across the boundary should be considered.

SUPPORT:

Signal coordination need not be maintained between control sections that operate on different cycle lengths.

For coordination with grade crossing signals and movable bridge signals, see Sections 4D.27, 4J.3, 8C.9, and 8C.10.

4D.2 Responsibility for Operation and Maintenance

GUIDANCE:

Prior to installing any traffic control signal, the responsibility for the maintenance of the signal and all of the appurtenances, hardware, software, and the timing plan(s) should be clearly established. The responsible agency should provide for the maintenance of the traffic control signal and all of its appurtenances in a competent manner.

To this end the agency should:

- A. Keep every controller assembly in effective operation in accordance with its predetermined timing schedule; check the operation of the controller assembly frequently enough to verify that it is operating in accordance with the predetermined timing schedule; and establish a policy to maintain a record of all timing changes and that only authorized persons are permitted to make timing changes;
- B. Clean the optical system of the signal sections and replace the light sources as frequently as experience proves necessary;
- C. Clean and service equipment and other appurtenances as frequently as experience proves necessary;

- D. Provide for alternate operation of the traffic control signal during a period of failure, using flashing mode or manual control, or manual traffic direction by proper authorities as might be required by traffic volumes or congestion, or by erecting other traffic control devices;
- E. Have properly skilled maintenance personnel available without undue delay for all signal malfunctions and signal indication failures;
- F. Provide spare equipment to minimize the interruption of traffic control signal operation as a result of equipment failure;
- G. Provide for the availability of properly skilled maintenance personnel for the repair of all components; and
- H. Maintain the appearance of the signal displays and equipment.

4D.3 Provisions for Pedestrians

SUPPORT:

Chapter 4E contains additional information regarding pedestrian signals and Chapter 4F contains additional information regarding pedestrian hybrid beacons.

STANDARD:

The design and operation of traffic control signals shall take into consideration the needs of pedestrian as well as vehicular traffic.

If engineering judgment indicates the need for provisions for a given pedestrian movement, signal faces conveniently visible to pedestrians shall be provided by pedestrian signal heads (see Chapter 4E) or a vehicular signal face(s) for a concurrent vehicular movement.

GUIDANCE:

Accessible pedestrian signals (see Sections 4E.9 through 4E.13) that provide information in non-visual format (such as audible tones, speech messages, and/or vibrating surfaces) should be provided where determined appropriate by engineering judgment.

Where pedestrian movements regularly occur, pedestrians should be provided with sufficient time to cross the roadway by adjusting the traffic control signal operation and timing to provide sufficient crossing time every cycle or by providing pedestrian detectors.

If it is necessary or desirable to prohibit certain pedestrian movements at a traffic control signal location no Pedestrian Crossing (R9-3) signs (see Section 2B.51) should be used. A barrier or other physical feature to physically prevent the

pedestrian movements should be considered in lieu of, or in addition to, signs.

4D.4 Meaning of Vehicular Signal Indications

SUPPORT:

The "Uniform Vehicle Code" (see Section 1A.11) is the primary source for the standards for the meaning of vehicular signal indications to both vehicle operators and pedestrians as provided in this Section, and the standards for the meaning of separate pedestrian signal head indications as provided in Section 4E.2.

The physical area that is defined as being "within the intersection" is dependent upon the conditions that are described in the definition of intersection in Section 1A.13.

STANDARD:

Unless otherwise determined by law, the following meanings shall be given to highway traffic signal indications for vehicles and pedestrians:

- A. Steady green signal indications shall have the following meanings:
 1. Vehicular traffic facing a CIRCULAR GREEN signal indication is permitted to proceed straight through or turn right or left or make a U-turn movement except as such movement is modified by lane-use signs, turn prohibition signs, lane markings, roadway design, separate turn signal indications, or other traffic control devices.

Such vehicular traffic, including vehicles turning right or left or making a U-turn movement, shall yield the right-of-way to:

 - (a) Pedestrians lawfully within an associated crosswalk, and
 - (b) Other vehicles lawfully within the intersection.

In addition, vehicular traffic turning left or making a U-turn movement to the left shall yield the right-of-way to other vehicles approaching from the opposite direction so closely as to constitute an immediate hazard during the time when such turning vehicle is moving across or within the intersection.
 2. Vehicular traffic facing a GREEN ARROW signal indication, displayed alone or in combination with another signal indication, is permitted to cautiously enter the intersection only to make the movement indicated by such arrow, or such other movement as is permitted by other signal indications displayed at the same time.

the turning movement(s) that conflicts with the signalized vehicular or pedestrian movement.

SUPPORT:

Figure 4D-20 illustrates application of these Standards on approaches that have only a shared left-turn/right-turn lane, and on approaches that have one or more exclusive turn lanes in addition to the shared left-turn/right-turn lane.

OPTION:

If the lane-use regulations on an approach are variable such that at certain times all of the lanes on the approach are designated as exclusive turn lanes and no lane is designated as a shared left-turn/right-turn lane:

- A. During the times that no lane is designated as a shared left-turn/right-turn lane, the left-turn and right-turn movements may start and terminate independently, and the left-turn and right-turn movements may be operated in one or more of the modes of operation as described in Sections 4D.17 through 4D.24; and
- B. If a protected-permissive mode is used, the shared left-turn/right-turn signal face provided previously may be modified to include a dual-arrow signal section capable of displaying both a GREEN ARROW signal indication and a flashing YELLOW ARROW signal indication for a turn movement(s) in order to not exceed the maximum of five sections per signal face provided in Section 4D.8.

4D.26 Yellow Change and Red Clearance Intervals

STANDARD:

A steady yellow signal indication shall be displayed following every CIRCULAR GREEN or GREEN ARROW signal indication and following every flashing YELLOW ARROW or flashing RED ARROW signal indication displayed as a part of a steady mode operation. This requirement shall not apply when a CIRCULAR GREEN, a flashing YELLOW ARROW, or a flashing RED ARROW signal indication is followed immediately by a GREEN ARROW signal indication.

The exclusive function of the yellow change interval shall be to warn traffic of an impending change in the right-of-way assignment.

The duration of the yellow change interval shall be determined using engineering practices.

Compliance Date: June 13, 2017

SUPPORT:

Section 4D.5 contains provisions regarding the display of steady CIRCULAR YELLOW signal indications to approaches from which drivers are allowed to make permissive left turns.

GUIDANCE:

When indicated by the application of engineering practices, the yellow change interval should be followed by a red clearance interval to provide additional time before conflicting traffic movements, including pedestrians, are released.

STANDARD:

When used, The duration of the red clearance interval shall be determined using engineering practices.

Compliance Date: June 13, 2017

SUPPORT:

Engineering practices for determining the duration of yellow change and red clearance intervals can be found in ITE's "Traffic Control Devices Handbook" and in ITE's "Manual of Traffic Signal Design" (see Section 1A.11).

STANDARD:

The durations of yellow change intervals and red clearance intervals shall be consistent with the determined values within the technical capabilities of the controller unit.

The duration of a yellow change interval shall not vary on a cycle-by-cycle basis within the same signal timing plan.

Except as provided in the following Option, the duration of a red clearance interval shall not be decreased or omitted on a cycle-by-cycle basis within the same signal timing plan.

OPTION:

The duration of a red clearance interval may be extended from its predetermined value for a given cycle based upon the detection of a vehicle that is predicted to violate the red signal indication.

When an actuated signal sequence includes a signal phase for permissive/protected (lagging) left-turn movements in both directions, the red clearance interval may be shown during those cycles when the lagging left-turn signal phase is skipped and may be omitted during those cycles when the lagging left-turn signal phase is shown.

The duration of a yellow change interval or a red clearance interval may be different in different signal timing plans for the same controller unit.

GUIDANCE:

A yellow change interval should have a minimum duration of 3 seconds and a maximum duration of 6 seconds. The longer intervals should be reserved for use on approaches with higher speeds.

Except when clearing a one-lane, two-way facility (see Section 4H.2) or when clearing an exceptionally wide intersection, a red clearance interval should have a duration not exceeding 6 seconds.

STANDARD:

Except for warning beacons mounted on advance warning signs on the approach to a signalized location (see Section 2C.36), signal displays that are intended to provide a "pre-yellow warning" interval, such as flashing green signal indications, vehicular countdown displays, or other similar displays, shall not be used at a signalized location.

SUPPORT:

The use of signal displays (other than warning beacons mounted on advance warning signs) that convey a "pre-yellow warning" have been found by research to increase the frequency of crashes.

4D.27 Preemption and Priority Control of Traffic Control Signals

OPTION:

Traffic control signals may be designed and operated to respond to certain classes of approaching vehicles by altering the normal signal timing and phasing plan(s) during the approach and passage of those vehicles. The alternative plan(s) may be as simple as extending a currently displayed green interval or as complex as replacing the entire set of signal phases and timing.

Preemption or priority control of traffic control signals may also be a means of assigning priority right-of-way to specified classes of vehicles at certain non-intersection locations such as on approaches to one-lane bridges and tunnels, movable bridges, highway maintenance and construction activities, metered freeway entrance ramps, and transit operations.

SUPPORT:

Refer to applicable state statutes and local ordinances that may define which vehicles are authorized to preempt traffic signals or to request priority at traffic signals.

Preemption control (see definition in Section 1A.13) is typically given to trains, boats, emergency vehicles, and light rail transit.

Examples of preemption control include the following:

- A. The prompt displaying of green signal indications at signalized locations ahead of fire vehicles, law enforcement vehicles, ambulances, and other official emergency vehicles;
- B. A special sequence of signal phases and timing to expedite and/or provide additional clearance time for vehicles to clear the tracks prior to the arrival of rail traffic; and
- C. A special sequence of signal phases to display a steady red indication to prohibit turning movements towards the tracks during the approach or passage of rail traffic

Priority control (see definition in Section 1A.13) is typically given to certain non-emergency vehicles such as light-rail transit vehicles operating in a mixed-use alignment and buses.

Examples of priority control include the following:

- A. The displaying of early or extended green signal indications at an intersection to assist public transit vehicles in remaining on schedule; and
- B. Special phasing to assist public transit vehicles in entering the travel stream ahead of the platoon of traffic.

Some types or classes of vehicles supersede others when a traffic control signal responds to more than one type or class. In general, a vehicle that is more difficult to control supersedes a vehicle that is easier to control.

STANDARD:

Strobe actuated preemption and priority detection systems shall respond to emitted frequencies:

- Preemption - 14.035 Hz \pm 0.05 Hz
- Priority - 9.639 Hz \pm 0.03 Hz

Railroad preemption shall have priority over all other types of preemption and priority, including authorized emergency vehicles.

GUIDANCE:

Traffic control signals operating under preemption control or under priority control should be operated in a manner designed to keep traffic moving.

Traffic control signals that are designed to respond under preemption or priority control to more than one type or class of vehicle should be designed to respond in the relative order of importance or difficulty in stopping the type or class of vehicle. The order of priority should be:

- A. High priority preemption, including trains and semi-exclusive alignment light rail crossings where the light rail transit movement is not controlled by a traffic control signal or a light rail transit signal.
- B. Emergency vehicle preemption.
- C. Transit priority, including buses and semiexclusive or mixed-use alignment light rail crossings where the light rail transit movement is controlled by a traffic control signal or a light rail transit signal.

If engineering judgment indicates that light rail transit signal indications would reduce road user confusion that might otherwise occur if standard traffic signal indications were used to control these movements, light rail transit signal indications complying with Section 8C.11 and as illustrated in Figure 8C-3 may be used for preemption or priority control of the following exclusive movements at signalized intersections:

The displayed period of each flash shall a minimum of 1/2 and a maximum of 2/3 of the total flash cycle.

Flashing signal indications shall comply with the requirements of other Sections of this Manual regarding visibility-limiting or positioning of conflicting signal indications, except that flashing yellow signal indications for through traffic shall not be required to be visibility-limited or positioned to minimize visual conflict for road users in separately controlled turn lanes.

Each traffic control signal shall be provided with an independent flasher mechanism that operates in compliance with this Section.

The flashing operation shall not be terminated by removal or turn-off of the controller unit or of the conflict monitor (malfunction management unit) or both.

A manual switch, a conflict monitor (malfunction management unit) circuit, and, if appropriate, automatic means shall be provided to initiate the flashing mode.

OPTION:

Based on engineering study or engineering judgment, traffic control signals may be operated in the flashing mode on a scheduled basis during one or more periods of the day rather than operated continuously in the steady (stop-and-go) mode.

SUPPORT:

Sections 4E.6 and 4E.9 contains information regarding the operation of pedestrian signal heads and accessible pedestrian signal detector pushbutton locator tones, respectively, during flashing operation.

4D.29 Flashing Operation - Transition Into Flashing Mode

STANDARD:

The transition from steady (stop-and-go) mode to flashing mode, if initiated by a conflict monitor (malfunction management unit) or by a manual switch, shall be permitted to be made at any time. Programmed changes from steady (stop-and-go) mode to flashing mode shall be made under either of the following circumstances:

- A. At the end of the common major-street red interval (such as just prior to the start of the green in both directions on the major street), or

- B. Directly from a CIRCULAR GREEN signal indication to a flashing CIRCULAR YELLOW signal indication or from a GREEN ARROW signal indication to a flashing YELLOW ARROW signal indication, or from a flashing YELLOW ARROW signal indication (see Sections 4D.17 to 4D.24) to a flashing YELLOW ARROW signal indication in a different signal section

.During programmed changes into flashing mode, no green signal indication or flashing yellow signal indication shall be terminated and immediately followed by a steady red or flashing red signal indication without first displaying the steady yellow signal indication.

4D.30 Flashing Operation - Signal Indications During Flashing Mode

GUIDANCE:

When a traffic control signal is operated in the flashing mode, a flashing yellow signal indication should be used for the major street and a flashing red signal indication should be used for the other approaches unless flashing red signal indications are used on all approaches.

STANDARD:

When a traffic control signal is operated in the flashing mode, all of the green signal indications at the signalized location shall be dark (non-illuminated) and shall not be displayed in either a steady or flashing manner, except for single-section GREEN ARROW signal indications as provided elsewhere in this Section.

Flashing yellow signal indications shall be used on more than one approach to a signalized location only if those approaches do not conflict with each other.

Except as provided in the following Option, when a traffic control signal is operated in the flashing mode, one and only one signal indication in every signal face at the signalized location shall be flashed.

OPTION:

If a signal face has two identical CIRCULAR RED or RED ARROW signal indications (see Section 4D.08), both of those identical signal indications may be flashed simultaneously.

STANDARD:

No steady indications, other than a single-section signal face consisting of a continuously displayed GREEN ARROW signal indication that is used alone to indicate a continuous movement in the steady (stop-and-go) mode, shall be displayed at the signalized location during the flashing mode. A single-section GREEN ARROW signal indication shall remain continuously displayed when the traffic control signal is operated in the flashing mode.

If a signal face includes both circular and arrow signal indications of the color that is to be flashed, only the circular signal indication shall be flashed.

All signal faces that are flashed on an approach shall flash the same color, either yellow or red, except that separate turn signal faces (see Sections 4D.17 and 4D.21) shall be permitted to flash a RED ARROW signal indication when the adjacent through movement signal indications are flashed yellow. Shared signal faces (see Sections 4D.17 and 4D.21) for turn movements shall not be permitted to flash a CIRCULAR RED signal indication when the adjacent through movement signal indications are flashed yellow.

The appropriate RED ARROW or YELLOW ARROW signal indication shall be flashed when a signal face consists entirely of arrow indications. A signal face that consists entirely of arrow indications and that provides a protected only turn movement during the steady (stop-and-go) mode or that provides a flashing YELLOW ARROW or flashing RED ARROW signal indication for a permissive turn movement during the steady (stop-and-go) mode shall be permitted to flash the YELLOW ARROW signal indication during the flashing mode if the adjacent through movement signal indications are flashed yellow and if it is intended that a permissive turn movement not requiring a full stop by each turning vehicle be provided during the flashing mode.

4D.31 Flashing Operation - Transition Out of Flashing Mode

STANDARD:

All changes from flashing mode to steady (stop-and-go) mode shall be made under one of the following procedures:

A. Yellow-red flashing mode: Changes from flashing mode to steady (stop-and-go) mode shall be made at the beginning of the major-street green interval (when a green signal indication is displayed to through traffic in both directions on the major street), or if there is no common major-street green interval, at the beginning of the green interval for the major traffic movement on the major street.

B. Red-red flashing mode: Changes from flashing mode to steady (stop-and-go) mode shall be made by changing the flashing red indications to steady red indications followed by appropriate green indications to begin the steady mode cycle. These green indications shall be the beginning of the major-street green interval (when a green signal indication is displayed to through traffic in both directions on the major street) or if there is no common major-street green interval, at the beginning of the green interval for the major traffic movement on the major street.

GUIDANCE:

The steady red clearance interval provided during the change from red-red flashing mode to steady (stop and go) mode should have a duration of 6 seconds.

When changing from the yellow-red flashing mode to steady (stop-and-go) mode, if there is no common major-street green interval, the provision of a steady red clearance interval for the other approaches before changing from a flashing yellow or a flashing red signal indication to a green signal indication on the major approach should be considered.

STANDARD:

During programmed changes out of flashing mode, no flashing yellow signal indication shall be terminated and immediately followed by a steady red or flashing red signal indication without first displaying the steady yellow signal indication.

OPTION:

Because special mid-block signals that rest in flashing circular yellow in the position normally occupied by the green signal indication do not have a green signal indication in the signal face, these signals may go directly from flashing circular yellow (in the position normally occupied by the green signal indication) to steady yellow without going first to a green signal indication.

4D.32 Temporary and Portable Traffic Control Signals

SUPPORT:

A temporary traffic control signal is generally installed using methods that minimize the costs of installation, relocation, and/or removal. Typical temporary traffic control signals are for specific purposes, such as for one-lane, two-way facilities in temporary traffic control zones (see Chapter 4G), for a haul-road intersection, or for access to a site that will have a permanent access point developed at another location in the near future.

STANDARD:

Advance signing shall be used when employing a temporary traffic control signal.

A temporary traffic control signal shall:

- A. Meet the physical display and operational requirements of a conventional traffic control signal.
- B. Be removed when no longer needed.
- C. Be placed in the flashing mode when not being used if it will be operated in the steady mode within 5

GUIDANCE:

Pedestrian signal head indications should be conspicuous and recognizable to pedestrians at all distances from the beginning of the controlled crosswalk to a point 10 feet from the end of the controlled crosswalk during both day and night.

For crosswalks where the pedestrian enters the crosswalk more than 100 feet from the pedestrian signal head indications, the symbols should be at least 9 inches high.

If the pedestrian signal indication is so bright that it causes excessive glare in nighttime conditions, some form of automatic dimming should be used to reduce the brilliance of the signal indication.

4E.5 Location and Height of Pedestrian Signal Heads

STANDARD:

Pedestrian signal heads shall be mounted with the bottom of the signal housing including brackets not less than 7 feet nor more than 10 feet above sidewalk level, and shall be positioned and adjusted to provide maximum visibility at the beginning of the controlled crosswalk.

If pedestrian signal heads are mounted on the same support as vehicular signal heads, there shall be a physical separation between them.

4E.6 Pedestrian Intervals and Signal Phases

STANDARD:

At intersections equipped with pedestrian signal heads, the pedestrian signal indications shall be displayed except when the vehicular traffic control signal is being operated in the flashing mode. At those times, the pedestrian signal indications shall not be displayed.

When the pedestrian signal heads associated with a crosswalk are displaying either a steady WALKING PERSON (symbolizing WALK) or a flashing UPRAISED HAND (symbolizing DON'T WALK) signal indication, a steady or a flashing red signal indication shall be shown to any conflicting vehicular movement that is approaching the intersection or mid-block location perpendicular or nearly perpendicular to the crosswalk.

When pedestrian signal heads are used, a WALKING PERSON (symbolizing WALK) signal indication shall be displayed only when pedestrians are permitted to leave the curb or shoulder.

A pedestrian change interval consisting of a flashing UPRAISED HAND (symbolizing DON'T WALK) signal indication shall begin immediately following the WALKING PERSON (symbolizing WALK) signal indication. Following the pedestrian change interval, a

buffer interval consisting of a steady UPRAISED HAND (symbolizing DON'T WALK) signal indication shall be displayed for at least 3 seconds prior to the release of any conflicting vehicular movement. The sum of the time of the pedestrian change interval and the buffer interval shall not be less than the calculated pedestrian clearance time (see the following paragraphs starting with the first Guidance paragraph and ending with the second Standard paragraph). The buffer interval shall not begin later than the beginning of the red clearance interval, if used.

Compliance Date: June 13, 2017

OPTION:

During the yellow change interval, the UPRAISED HAND (symbolizing DON'T WALK) signal indication may be displayed as either a flashing indication, a steady indication, or a flashing indication for an initial portion of the yellow change interval and a steady indication for the remainder of the interval.

SUPPORT:

Figure 4E-2 illustrates the pedestrian intervals and their possible relationships with associated vehicular signal phase intervals.

GUIDANCE:

Except as provided above, the pedestrian clearance time should be sufficient to allow a pedestrian crossing in the crosswalk who left the curb or shoulder at the end of the WALKING PERSON (symbolizing WALK) signal indication to travel at a walking speed of 3.5 feet per second, to at least the far side of the traveled way or to a median of sufficient width for pedestrians to wait.

OPTION:

A walking speed of up to 4 feet per second may be used to evaluate the sufficiency of the pedestrian clearance time at locations where an extended pushbutton press function has been installed to provide slower pedestrians an opportunity to request and receive a longer pedestrian clearance time. Passive pedestrian detection may also be used to automatically adjust the pedestrian clearance time based on the pedestrian's actual walking speed or actual clearance of the crosswalk.

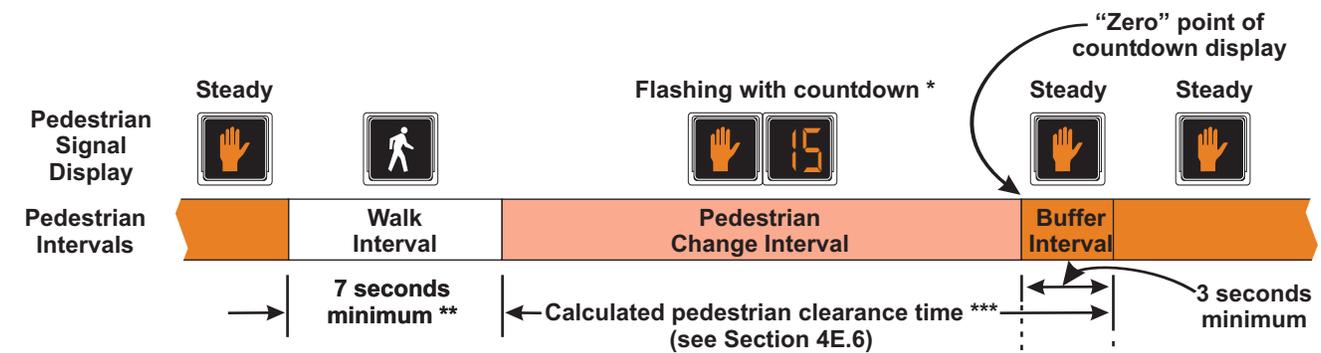
The additional time provided by an extended pushbutton press to satisfy pedestrian clearance time needs may be added to either the walk interval or the pedestrian change interval.

GUIDANCE:

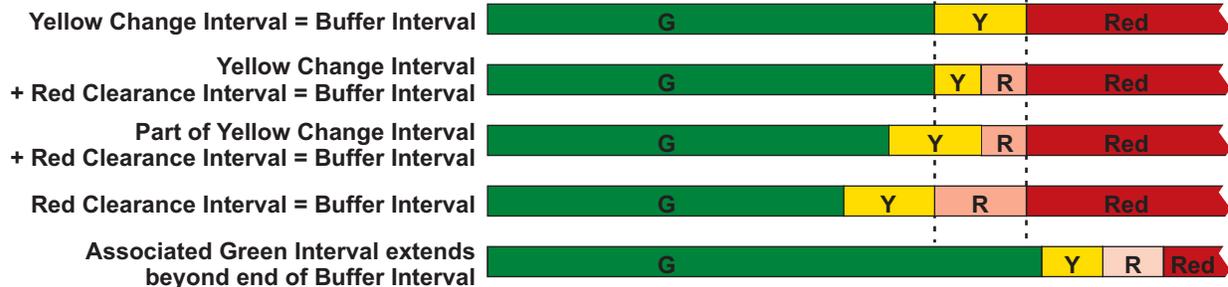
Where pedestrians who walk slower than 3.5 feet per second, or pedestrians who use wheelchairs, routinely use the crosswalk, a walking speed of less than 3.5 feet per second should be considered in determining the pedestrian clearance time.

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Relationship to associated vehicular phase intervals:



Legend

G = Green Interval
 Y = Yellow Change Interval (of at least 3 seconds)
 R = Red Clearance Interval
 Red = Red because conflicting traffic has been released

* The countdown display is optional for Pedestrian Change Intervals of 7 seconds or less.

** The Walk Interval may be reduced under some conditions (see Section 4E.6).

*** The Buffer Interval, which shall always be provided and displayed, may be used to help satisfied the calculated pedestrian clearance time, or may begin after the calculated pedestrian clearance time has ended.

Figure 4E-2. Pedestrian Intervals

Except as provided in below, the walk interval should be at least 7 seconds in length so that pedestrians will have adequate opportunity to leave the curb or shoulder before the pedestrian clearance time begins.

OPTION:

If pedestrian volumes and characteristics do not require a 7-second walk interval, walk intervals as short as 4 seconds may be used.

SUPPORT:

The walk interval is intended for pedestrians to start their crossing. The pedestrian clearance time is intended to allow pedestrians who started crossing during the walk interval to complete their crossing. Longer walk intervals are often used when the duration of the vehicular green phase associated with the pedestrian crossing is long enough to allow it.

GUIDANCE:

The total of the walk interval and pedestrian clearance time should be sufficient to allow a pedestrian crossing in the crosswalk who left the pedestrian detector (or, if no pedestrian detector is present, a location 6 feet from the face of the curb or from the edge of the pavement) at the beginning of the WALKING PERSON (symbolizing WALK) signal indication to travel at a walking speed of 3 feet per second to the far side of the traveled way being crossed or to the median if a two-stage pedestrian crossing sequence is used. Any additional time that is required to satisfy the conditions of this paragraph should be added to the walk interval.

OPTION:

On a street with a median of sufficient width for pedestrians to wait, a pedestrian clearance time that allows the pedestrian to cross only from the curb or shoulder to the median may be provided.

STANDARD:

Where the pedestrian clearance time is sufficient only for crossing from the curb or shoulder to a median of sufficient width for pedestrians to wait median-mounted pedestrian signals (with pedestrian detectors if actuated operation is used) shall be provided (see Sections 4E.8 and 4E.9) and signing such as the R10-3d sign (see Section 2B.52) shall be provided to notify pedestrians to cross only to the median to await the next WALKING PERSON (symbolizing WALK) signal indication.

GUIDANCE:

Where median-mounted pedestrian signals and detectors are provided, the use of accessible pedestrian signals (see Sections 4E.09 through 4E.13) should be considered.

OPTION:

During the transition into preemption, the walk interval and the pedestrian change interval may be shortened or omitted as described in Section 4D.27.

At intersections with high pedestrian volumes and high conflicting turning vehicle volumes, a brief leading pedestrian interval, during which an advance WALKING PERSON (symbolizing WALK) indication is displayed for the crosswalk while red indications continue to be displayed to parallel through and/or turning traffic, may be used to reduce conflicts between pedestrians and turning vehicles.

GUIDANCE:

If a leading pedestrian interval is used, the use of accessible pedestrian signals (see Sections 4E.09 through 4E.13) should be considered.

SUPPORT:

If a leading pedestrian interval is used without accessible features, pedestrians who are visually impaired can be expected to begin crossing at the onset of the vehicular movement when drivers are not expecting them to begin crossing.

GUIDANCE:

If a leading pedestrian interval is used, it should be at least 3 seconds in duration and should be timed to allow pedestrians to cross at least one lane of traffic or, in the case of a large corner radius, to travel far enough for pedestrians to establish their position ahead of the turning traffic before the turning traffic is released.

If a leading pedestrian interval is used, consideration should be given to prohibiting turns across the crosswalk during the leading pedestrian interval.

SUPPORT:

At intersections with pedestrian volumes that are so high that drivers have difficulty finding an opportunity to turn across the crosswalk, the duration of the green interval for a parallel concurrent vehicular movement is sometimes intentionally set to extend beyond the pedestrian clearance time to provide turning drivers additional green time to make their turns while the pedestrian signal head is displaying a steady UPRAISED HAND (symbolizing DONT WALK) signal indication after pedestrians have had time to complete their crossings.

4E.7 Countdown Pedestrian Signals

STANDARD:

All pedestrian signal heads used at crosswalks where the pedestrian change interval is more than 7 seconds shall include a pedestrian change interval countdown display in order to inform pedestrians of the number of seconds remaining in the pedestrian change interval.

OPTION:

Pedestrian signal heads used at crosswalks where the pedestrian change interval is 7 seconds or less may include a pedestrian change interval countdown display in order to inform pedestrians of the number of seconds remaining in the pedestrian change interval.

STANDARD:

Where countdown pedestrian signals are used, the countdown shall always be displayed simultaneously with the flashing UPRAISED HAND (symbolizing DONT WALK) signal indication displayed for that crosswalk.

Countdown pedestrian signals shall consist of Portland orange numbers that are at least 6 inches in height on a black opaque background. The countdown pedestrian signal shall be located immediately adjacent to the associated UPRAISED HAND (symbolizing DONT WALK) pedestrian signal head indication (see Figure 4E-1).

The display of the number of remaining seconds shall begin only at the beginning of the pedestrian change interval (flashing UPRAISED HAND). After the countdown displays zero, the display shall remain dark until the beginning of the next countdown.

The countdown pedestrian signal shall display the number of seconds remaining until the termination of the pedestrian change interval (flashing UPRAISED HAND). Countdown displays shall not be used during the walk interval or during the red clearance interval of a concurrent vehicular phase.

GUIDANCE:

If used with a pedestrian signal head that does not have a concurrent vehicular phase, the pedestrian change interval (flashing UPRAISED HAND) should be set to be approximately 4 seconds less than the required pedestrian clearance time (see Section 4E.6) and an additional clearance interval (during which a steady UPRAISED HAND is displayed) should be provided prior to the start of the conflicting vehicular phase.

For crosswalks where the pedestrian enters the crosswalk more than 100 feet from the countdown pedestrian signal display, the numbers should be at least 9 inches in height.

Because some technology includes the countdown pedestrian signal logic in a separate timing device that is independent of the timing in the traffic signal controller, care should be exercised by the engineer when timing changes are made to pedestrian change intervals.

If the pedestrian change interval is interrupted or shortened as a part of a transition into a preemption sequence (see Section 4E.6), the countdown pedestrian signal display should be discontinued and go dark immediately upon activation of the preemption transition.

4E.8 Pedestrian Detectors

OPTION:

Pedestrian detectors may be pushbuttons or passive detection devices.

SUPPORT:

Passive detection devices register the presence of a pedestrian in a position indicative of a desire to cross, without requiring the pedestrian to push a button. Some passive detection devices are capable of tracking the progress of a pedestrian as the pedestrian crosses the roadway for the purpose of extending or shortening the duration of certain pedestrian timing intervals.

The provisions in this Section place pedestrian pushbuttons within easy reach of pedestrians who are intending to cross each crosswalk and make it obvious which pushbutton is associated with each crosswalk. These provisions also position pushbutton poles in optimal locations for installation of accessible pedestrian signals (see Sections 4E.09 through 4E.13). Information regarding reach ranges can be found in the "Americans with Disabilities Act Accessibility Guidelines for Buildings and Facilities (ADAAG)" (see Section 1A.11).

GUIDANCE:

If pedestrian pushbuttons are used, they should be capable of easy activation and conveniently located near each end of the crosswalks. Except as provided in the following 2 paragraphs, pedestrian pushbuttons should be located to meet all of the following criteria:

- A. Unobstructed and adjacent to a level all-weather surface to provide access from a wheelchair;
- B. Where there is an all-weather surface, a wheelchair accessible route from the pushbutton to the ramp;
- C. Between the edge of the crosswalk line (extended) farthest from the center of the intersection and the side of a curb ramp (if present), but not greater than 5 feet from said crosswalk line;
- D. Between 1.5 and 6 feet from the edge of the curb, shoulder, or pavement;
- E. With the face of the pushbutton parallel to the crosswalk to be used; and
- F. At a mounting height of approximately 3.5 feet, but no more than 4 feet, above the sidewalk.

Where there are constraints that make it impractical to place the pedestrian pushbutton adjacent to a level all-weather surface, the surface should be as level as feasible.

Where there are constraints that make it impractical to place the pedestrian pushbutton between 1.5 and 6 feet from the edge of the curb, shoulder, or pavement, it should not be farther than 10 feet from the edge of curb, shoulder, or pavement.

Except as provided in the following Option, where two pedestrian pushbuttons are provided on the same corner of a signalized location, the pushbuttons should be separated by a distance of at least 10 feet.

OPTION:

Where there are constraints on a particular corner that make it impractical to provide the 10-foot separation between the two pedestrian pushbuttons, the pushbuttons may be placed closer together or on the same pole

STANDARD:

Signs (see Section 2B. 52) shall be mounted adjacent to or integral with pedestrian pushbuttons, explaining their purpose and use.

OPTION:

At certain locations, a supplemental sign in a more visible location may be used to call attention to the pedestrian pushbutton.

STANDARD:

The positioning of pedestrian pushbuttons and the legends on the pedestrian pushbutton signs shall clearly

extensions or other techniques to provide adequate sight distance,

- C. The installation should include suitable standard signs and pavement markings, and
- D. If installed within a signal system, the pedestrian hybrid beacon should be coordinated.
- E. If installed at an intersection, appropriate side street traffic control should be considered.

On approaches having posted or statutory speed limits or 85th-percentile speeds in excess of 35 mph and on approaches having traffic or operating conditions that would tend to obscure visibility of roadside hybrid beacon face locations, both of the minimum of two pedestrian hybrid beacon faces should be installed over the roadway.

On multi-lane approaches having a posted or statutory speed limits or 85th-percentile speeds of 35 mph or less, either a pedestrian hybrid beacon face should be installed on each side of the approach (if a median of sufficient width exists) or at least one of the pedestrian hybrid beacon faces should be installed over the roadway.

A pedestrian hybrid beacon should comply with the signal face location provisions described in Sections 4D.11 through 4D.16.

STANDARD:

A CROSSWALK STOP ON RED (symbolic circular red) (R10-23) sign (see Section 2B.53) shall be mounted adjacent to a pedestrian hybrid beacon face on each major street approach. If an overhead pedestrian hybrid beacon face is provided, the sign shall be mounted adjacent to the overhead signal face.

OPTION:

A Pedestrian (W11-2) warning sign (see Section 2C.50) with an AHEAD (W16-9P) supplemental plaque may be placed in advance of a pedestrian hybrid beacon. A warning beacon may be installed to supplement the W11-2 sign.

GUIDANCE:

If a warning beacon supplements a W11-2 sign in advance of a pedestrian hybrid beacon, it should be programmed to flash only when the pedestrian hybrid beacon is not in the dark mode.

STANDARD:

If a warning beacon is installed to supplement the W11-2 sign, the design and location of the warning beacon shall comply with the provisions of Sections 4L.1 and 4L.3.

4F.3 Operation of Pedestrian Hybrid Beacons

STANDARD:

Pedestrian hybrid beacon indications shall be dark (not illuminated) during periods between actuations.

Upon actuation by a pedestrian, a pedestrian hybrid beacon face shall display a flashing CIRCULAR yellow signal indication, followed by a steady CIRCULAR yellow signal indication, followed by both steady CIRCULAR RED signal indications during the pedestrian walk interval, followed by alternating flashing CIRCULAR RED signal indications during the pedestrian change interval (see Figure 4F-3). Upon termination of the pedestrian change interval, the pedestrian hybrid beacon faces shall revert to a dark (not illuminated) condition.

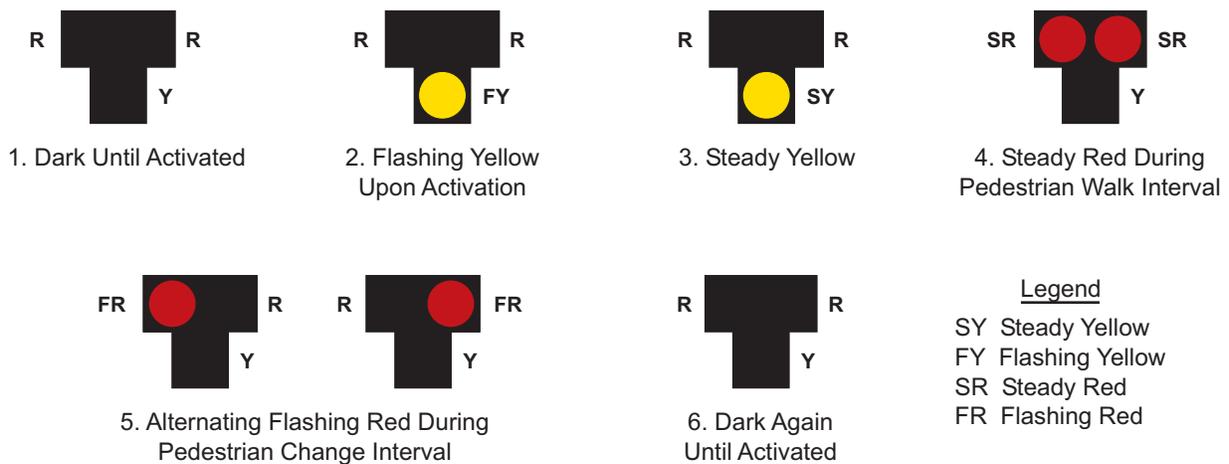


Figure 4F-3. Sequence for a Pedestrian Hybrid Beacon

Except as provided in the following Option, the pedestrian signal heads shall continue to display a steady UPRAISED HAND (symbolizing DONT WALK) signal indication when the pedestrian hybrid beacon faces are either dark or displaying flashing or steady CIRCULAR yellow signal indications. The pedestrian signal heads shall display a WALKING PERSON (symbolizing WALK) signal indication when the pedestrian hybrid beacon faces are displaying steady CIRCULAR RED signal indications. The pedestrian signal heads shall display a flashing UPRAISED HAND (symbolizing DONT WALK) signal indication when the pedestrian hybrid beacon faces are displaying alternating flashing CIRCULAR RED signal indications. Upon termination of the pedestrian change interval, the pedestrian signal heads shall revert to a steady UPRAISED HAND (symbolizing DONT WALK) signal indication.

OPTION:

Where the pedestrian hybrid beacon is installed adjacent to a roundabout to facilitate crossings by pedestrians with visual disabilities and an engineering study determines that pedestrians without visual disabilities can be allowed to cross the roadway without actuating the pedestrian hybrid beacon, the pedestrian signal heads may be dark (not illuminated) when the pedestrian hybrid beacon faces are dark.

GUIDANCE:

The duration of the flashing yellow interval should be determined by engineering judgment.

STANDARD:

The duration of the steady yellow change interval shall be determined using engineering practices.

GUIDANCE:

The steady yellow interval should have a minimum duration of 3 seconds and a maximum duration of 6 seconds (see Section 4D.26). The longer intervals should be reserved for use on approaches with higher speeds.

PART 5. TRAFFIC CONTROL DEVICES FOR LOW VOLUME ROADS

Chapter 5B. Regulatory Signs

5B.1 Introduction

SUPPORT:

The purpose of a regulatory sign is to inform highway users of traffic laws or regulations, and to indicate the applicability of legal requirements that would not otherwise be apparent.

The criteria provisions for regulatory signs are contained in Chapter 2B and in other Sections of this Manual. Criteria Provisions for regulatory signs that are specific to low-volume roads are contained in this Chapter.

5B.2 STOP and YIELD Signs (R1-1 and R1-2)



R1-1



R1-2

GUIDANCE:

STOP (R1-1) and YIELD (R1-2) signs should be considered for use on low-volume roads where engineering judgment or study, consistent with the provisions of Sections 2B.4 to 2B.10, indicates that either of the following conditions applies:

- A. An intersection of a less-important road with a main road where application of the normal right-of-way rule might not be readily apparent.
- B. An intersection that has restricted sight distance for the prevailing vehicle speeds.

5B.3 Speed Limit Signs (R2 Series)



R2-1

STANDARD:

If used, Speed Limit (R2 series) signs (see Figure 5B-1) shall display the speed limit established by law, ordinance, regulation, or as adopted by the authorized agency following an engineering study. The displayed speed limits shall be in multiples of 5 mph.

Speed limits shall be established in accordance with Section 2B.13.

OPTION:

Speed limit signs may be used on low-volume roads that carry traffic from, onto, or adjacent to higher-volume roads that have posted speed limits.

5B.4 Traffic Movement and Prohibition Signs (R3, R4, R5, R6, R9, R10, R11, R12, R13, and R14 Series)



R4-1



R4-7



R5-1



R5-2



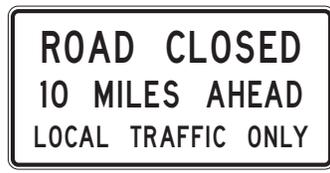
R6-2



R12-2



R11-2



R11-3a



R11-4

SUPPORT:

The regulatory signs in these series inform road users of required, permitted, or prohibited traffic movements involving turn, alignment, exclusion, and pedestrians.

STANDARD:

If used, signs for traffic prohibitions or restrictions shall be placed in advance of the prohibition or restriction so that traffic can use an alternate route or turn around.

GUIDANCE:

Signs should be used on low-volume roads to indicate traffic prohibitions and restrictions such as road closures and weight restrictions.

OPTION:

Signs for traffic prohibitions or restrictions may be used on a low-volume road near and at the intersections or the connections with a higher class of road, and where the regulatory message is essential for transition from the low-volume road to the higher-class facility or vice versa.

5B.5 Parking Signs (R8 Series)



R8-3



R8-3a



R8-3cP



R8-3dP

OPTION:

Parking signs may be installed selectively on low-volume roads with due consideration of enforcement.

5B.6 Other Regulatory Signs

STANDARD:

Other regulatory signs used on low-volume roads that are not discussed in Part 5 shall comply with the provisions contained in other Parts of this Manual.

PART 5. TRAFFIC CONTROL DEVICES FOR LOW VOLUME ROADS

Chapter 5C. Warning Signs

5C.1 Introduction

SUPPORT:

The purpose of a warning sign is to provide advance warning to the road user of unexpected conditions on or adjacent to the roadway that might not be readily apparent.

The provisions for warning signs are contained in Chapter 2C and in other Sections of this Manual. Provisions for warning signs that are specific to low-volume roads are contained in this Chapter.

5C.2 Horizontal Alignment Signs (W1-1 through W1-8)



W1-1

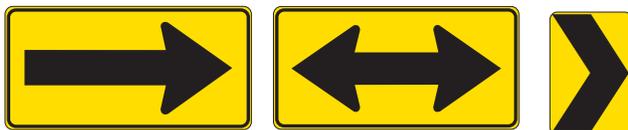
W1-2

W1-3



W1-4

W1-5



W1-6

W1-7

W1-8

SUPPORT:

Horizontal Alignment signs (see Sections 2C.6 through 2C.12 and Figure 5C-1) include turn, curve, reverse turn, reverse curve, winding road, large arrow, and chevron alignment signs.

OPTION:

Horizontal Alignment signs may be used where engineering judgment indicates a need to inform the road user of a change in the horizontal alignment of the roadway.

5C.3 Intersection Warning Signs (W2-1 through W2-6)



W2-1

W2-2

W2-3



W2-4

W2-5

W2-6

SUPPORT:

Intersection signs (see Figure 5C-1) include the crossroad, side road, T-symbol, Y-symbol, and circular intersection signs.

OPTION:

Intersection signs may be used where engineering judgment indicates a need to inform the road user in advance of an intersection.

5C.4 Stop Ahead and Yield Ahead Signs (W3-1, W3-2)



W3-1



W3-2

STANDARD:

A Stop Ahead (W3-1) sign shall be used where a STOP sign is not visible for a sufficient distance to permit the road user to bring the vehicle to a stop at the STOP sign.

A Yield Ahead (W3-2) sign shall be used where a YIELD sign is not visible for a sufficient distance to permit the road user to bring the vehicle to a stop, if necessary, at the YIELD sign.

5C.5 NARROW BRIDGE Sign (W5-2)



W5-2

OPTION:

The NARROW BRIDGE (W5-2) sign may be used on an approach to a bridge or culvert that has a clear width less than that of the approach roadway.

5C.6 ONE LANE BRIDGE Sign (W5-3)



W5-3

GUIDANCE:

A ONE LANE BRIDGE (W5-3) sign should be used on low-volume, two-way roadways in advance of any bridge or culvert;

- A. Having a clear roadway width of less than 16 feet; or
- B. Having a clear roadway width of less than 18 feet when commercial vehicles constitute a high proportion of the traffic; or
- C. Having a clear roadway width of 18 feet or less where the approach sight distance is limited on the approach to the structure.

OPTION:

Roadway alignment and additional warning may be provided on the approach to a bridge or culvert by the use of object markers and/or delineators.

5C.7 Hill Sign (W7-1)



W7-1

OPTION:

An engineering study of vehicles and road characteristics, such as percent grade and length of grade, may be conducted to determine hill signing requirements.

5C.8 PAVEMENT ENDS Sign (W8-3)



W8-3

OPTION:

A PAVEMENT ENDS (W8-3) sign may be used to warn road users where a paved surface changes to a gravel or earth road surface.

5C.9 Vehicular Traffic Warning and Non-Vehicular Warning Signs (W11 Series and W8-6)



W8-6



W11-1



W11-2



W11-3



W11-4



W11-5



W11-6



W11-8



W11-10

GUIDANCE:

Vehicular Traffic Warning signs should be used to alert road users to locations where frequent unexpected entries into the roadway by trucks, bicyclists, farm vehicles, fire trucks, and other vehicles might occur. Such signs should be used only at locations where the road user's sight distance is restricted or the condition, activity or entering traffic would be unexpected.

OPTION:

Non-Vehicular Warning signs (see Section 2C-50) may be used to alert road users in advance of locations where unexpected entries into the roadway or shared use by pedestrians, large animals, or other crossing activities might occur.



W7-3aP



W16-2P



W16-9P

A W7-3aP, W16-2P, or W16-9P supplemental plaque, with the legend NEXT XX MILES, XX FEET, or AHEAD may be installed below a Vehicular Traffic Warning or Non-Vehicular Warning sign (see Sections 2C.49 and 2C.50) to inform road users that they are approaching a portion of the roadway or a point where crossing activity might occur.

STANDARD:

When a Non-Vehicular Warning sign is placed at the location of the crossing point, a diagonal downward pointing arrow (W16-7P) plaque (see Figure 5C-2) shall be mounted below the sign.

GUIDANCE:

If the activity is seasonal or temporary, the sign should be removed or covered when the crossing activity does not exist.

5C.10 Advisory Speed Plaque (W13-1P)

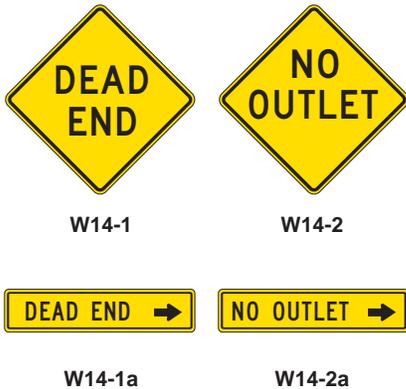


W13-1P

OPTION:

An Advisory Speed (W13-1) plaque may be mounted below a warning sign when the condition requires a reduced speed.

5C.11 DEAD END or NO OUTLET Signs (W14-1, W14-1a, W14-2, and W14-2a)



OPTION:

The DEAD END (W14-1) and NO OUTLET (W14-2) signs and the DEAD END (W14-1a) and NO OUTLET (W14-2a) signs may be used to warn road users of a road that has no outlet or that terminates in a dead end or cul-de-sac.

GUIDANCE:

If used, these signs should be placed at a location that gives drivers of large commercial or recreational vehicles an opportunity to select a different route or turn around.

5C.11.1 MINIMUM MAINTENANCE ROAD Sign (W21-X8)



W21-X8

SUPPORT:

The conditions and procedures for designating minimum maintenance roads are specified in Minnesota Statute 160.095, subd. 1.

By Statute, the designation of a minimum maintenance road is effective on the erection of MINIMUM MAINTENANCE ROAD signs.

STANDARD:

The signs shall be posted at entry points to and at regular intervals along a minimum maintenance road.

5C.12 No Traffic Signs (W18-1)

This section has been removed from the Manual.

5C.13 Other Warning Signs

STANDARD:

Other warning signs used on low-volume roads that are not discussed in Part 5, but are in this Manual, shall comply with the provisions contained in other Parts of this Manual. Warning signs that are not provided in this Manual shall comply with the provisions in Sections 2C.2 and 2C.3.

5C.14 Object Markers and Barricades

SUPPORT:

The purpose of object markers is to mark obstructions located within or adjacent to the roadway, such as bridge abutments, drainage structures, and other physical objects.

GUIDANCE:

The end of a low-volume road should be marked with a Type 4 object marker in compliance with Section 2C.66.

OPTION:

A Type 3 barricade may be used where engineering studies or judgment indicates a need for a more visible end-of-roadway treatment (see Section 3F.1).

STANDARD:

Barricades used on low-volume roads shall comply with the provisions contained in Section 2B.67.

PART 6. TEMPORARY TRAFFIC CONTROL

Chapter 6D. Pedestrian and Worker Safety

6D.1 Pedestrian Considerations

SUPPORT:

A wide range of pedestrians can be expected at work sites, 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.2.

STANDARD:

The various temporary traffic control provisions for pedestrian and worker safety contained 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 by the maintaining agency.

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

OPTION:

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

If an existing pedestrian route is impacted by a short-term or short-duration work zone that is attended with project personnel, establishing an alternate pedestrian route may not be necessary if the work can be stopped and pedestrians can navigate the work zone safely. Pedestrians may be delayed for a short period of time for project personnel to move equipment and material to facilitate passage.

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:

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

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

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

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

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 motor vehicle traffic. Unless an acceptable route that does not involve crossing the roadway can be provided, pedestrians should be appropriately directed with advance signing that encourages them to cross to the opposite side of the roadway. In urban and suburban areas with high motor vehicle 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:

Layouts 6J-24 and 6J-25 as well as Layouts 84 and 85 in Chapter 6K show typical TTC device usage and techniques for pedestrian movement through work zones.

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 plan.

B. Access to transit stops should be maintained.

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

D. The width of the existing pedestrian facility should be provided for the temporary facility if practical. Traffic control devices and other construction materials and features should not intrude into the usable width of the sidewalk, temporary pathway, or other pedestrian facility. When it is not possible to maintain a minimum width of 60 inches throughout the entire length of the pedestrian pathway, a 60 x 60-inch

passing space should be provided at least every 200 feet to allow individuals in wheelchairs to pass.

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

OPTION:

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

GUIDANCE:

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.

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 non-intersection 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 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 chain link 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.

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.

6D.2 Accessibility Considerations

SUPPORT:

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

GUIDANCE:

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

STANDARD:

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

SUPPORT:

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:

Because printed signs and surface delineation are not usable by pedestrians with visual disabilities, blocked routes, alternate crossings, and sign and signal information

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

SUPPORT:

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

GUIDANCE:

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.

OPTION:

The Pedestrian Accessibility Checklist (see Figure 6D-1) may be used by the project designer during the TTC design stage of a project to assure that all considerations have been made to accommodate the needs of pedestrians, including those with disabilities.

6D.3 Worker 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. Temporary Traffic Barriers - temporary traffic barriers should be placed along the work space depending on factors such as lateral clearance of workers from adjacent traffic, speed of traffic, duration and type of operations, time of day, and volume of traffic.
- C. Speed Reduction - reducing the speed of vehicular traffic, mainly through regulatory speed zoning, funneling, lane reduction, or the use of uniformed law enforcement officers or flaggers, should be considered.
- D. Activity Area - planning the internal work activity area to minimize backing-up maneuvers of construction vehicles should be considered to minimize the exposure to risk.
- E. Worker Safety Planning-a trained person designated by the employer should conduct a basic hazard assessment for the worksite and job classifications required in the activity area. This safety professional should determine whether engineering, administrative, or personal protection measures should be implemented. This plan should be in accordance with the Occupational Safety and Health Act of 1970, as amended, "General Duty Clause" Section 5(a)(1) - Public Law 91-596, 84 Stat. 1590, December 29, 1970, as amended, and with the requirement to assess worker risk exposures for each job site and job classification, as per 29 CFR 1926.20 (b)(2) of "Occupational Safety and Health Administration Regulations, General Safety and Health Provisions" (see Section 1A.11).

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STANDARD:

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

Compliance Date: December 31, 2011

OPTION:

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

GUIDANCE:

When working in an area that does not require the use of a hard hat for head protection, a high visibility hat in the above colors should be worn.

STANDARD:

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

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

Compliance Date: December 31, 2011

OPTION:

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

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 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 motor vehicle traffic and to improve safety through the TTC zone.

PART 6. TEMPORARY TRAFFIC CONTROL

Chapter 6E. Flagger Control

6E.1 Qualifications for Flaggers

SUPPORT:

Minnesota Statute 169.06, subd. 4(e), allows a flagger to stop and hold traffic as necessary to ensure the safety of highway workers and the motoring public.

Minnesota Statute 169.06, subd. 4(a) requires the driver of any vehicle to obey the instructions of any official traffic-control device placed in accordance with the provisions of Chapter 169, unless otherwise directed by a traffic or police officer.

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.

6E.2 High-Visibility Safety Apparel

STANDARD:

High visibility apparel shall comply with current Minnesota OSHA Rules 5207.0100 and 5207.1000 and your agency's policies.

For daytime and nighttime activity, flaggers shall wear high-visibility safety apparel that meets the Performance Class 2 or 3 requirements of the ANSI/ISEA 107-2004 publication entitled "American National Standard for High-Visibility Apparel and Headwear" (see Section 1A.11), or equivalent revisions, and labeled as meeting the ANSI 107-2004 standard performance for Class 2 or 3 risk exposure. The apparel background (outer) material color shall be fluorescent orange-red, fluorescent yellow-green, or a

combination of the two as defined in the ANSI standard. The retroreflective material shall be orange, yellow, white, silver, yellow-green, or a fluorescent version of these colors, and shall be visible at a minimum distance of 1,000 feet. The retroreflective safety apparel shall be designed to clearly identify the wearer as a person.

For nighttime activity, high-visibility safety apparel that meets the Performance Class 3 requirements of the ANSI/ISEA 107-2004 publication entitled "American National Standard for High-Visibility Apparel and Headwear" (see Section 1A.11), or equivalent revisions, and labeled as meeting the ANSI 107-2004 standard performance for Class 3 risk exposure shall be considered for flagger wear.

STANDARD:

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

OPTION:

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

Compliance Date: December 31, 2011

6E.3 Hand-Signaling Devices

GUIDANCE:

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

GUIDANCE:

The STOP/SLOW paddle should be fabricated from light semi-rigid material.

SUPPORT:

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

OPTION:

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

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

STANDARD:

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 red or fluorescent orange-red in color, shall be a minimum of 24 inches square, and shall be securely fastened to a staff that is approximately 36 inches in length.

GUIDANCE:

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 or fluorescent orange-red.

OPTION:

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

STANDARD:

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

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

6E.4 Automated Flagger Assistance Devices

SUPPORT:

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

Sign or Plaque	Sign Designation	Section	Conventional Road	Freeway or Expressway	Minimum
Stop	R1-1	6F.6	30 x 30 *	---	---
Stop (on Stop/Slow Paddle)	R1-1	6E.3	18 x 18	---	---
Yield	R1-2	6E.6	36 x 36 x 36	---	30 x 30 x 30
To Oncoming Traffic	R1-2aP	6E.6	36 x 30	48 x 36	24 x 18
Speed Limit	R2-1	6F.12	24 x 30 *	36 x 48	---
Fines Higher (plaque)	R2-6P	6F.12	24 x 18	36 x 24	---
Fines Double (plaque)	R2-6aP	6F.12	24 x 18	36 x 24	---
\$XX Fine (plaque)	R2-6bP	6F.12	24 x 18	36 x 24	---
Begin Higher Fines Zone	R2-10	6F.12	24 x 30	36 x 48	---
End Higher Fines Zone	R2-11	6F.12	24 x 30	36 x 48	---
End Work Zone Speed Limit	R2-12	6F.12	24 x 36	36 x 54	---
Movement Prohibition	R3-1,2,3,4,18,27	6F.6	24 x 24 *	36 x 36	---
Mandatory Movement (1 lane)	R3-5	6F.6	30 x 36	---	---
Optional Movement (1 lane)	R3-6	6F.6	30 x 36	---	---
Right (Left) Lane Must Turn Right (Left)	R3-7	6F.6	30 x 30 *	---	---
Advance Intersection Lane Control	R3-30	6F.6	Varies x 30	---	---
Do Not Pass	R4-1	6F.6	24 x 30	36 x 48	---
Pass With Care	R4-2	6F.6	24 x 30	36 x 48	---
Keep Right	R4-7	6F.6	24 x 30	36 x 48	---
Narrow Keep Right	R4-7c	6F.6	18 x 30	---	---
Stay in Lane	R4-9	6F.11	24 x 30	36 x 48	---
Do Not Enter	R5-1	6F.6	30 x 30 *	36 x 36	---
Wrong Way	R5-1a	6F.6	36 x 30 *	42 x 30	---
One Way	R6-1	6F.6	36 x 12 *	54 x 18	---
One Way	R6-2	6F.6	24 x 30 *	36 x 48	---
No Parking (symbol)	R8-3	6F.13	24 x 24	36 x 36	---
Pedestrian Crosswalk	R9-8	6F.14	36 x 18	---	---
Sidewalk Closed	R9-9	6F.14	24 x 12	---	---
Sidewalk Closed, Use Other Side	R9-10	6F.14	24 x 12	---	---
Sidewalk Closed Ahead, Cross Here	R9-11	6F.14	24 x 18	---	---
Sidewalk Closed, Cross Here	R9-11a	6F.14	24 x 12	---	---
Wait on Stop/Go on Slow	R10-X1	6E.3	24 x 30	24 x 30	---
Road Closed	R11-2	6F.8	48 x 30	---	---
Road Closed, Local Traffic Only	R11-3a,3b,4	6F.9	60 x 30	---	---
Weight Limit	R12-1,2	6F.10	24 x 30	36 x 48	---
Weight Limit (with symbols)	R12-5	6F.10	24 x 36	36 x 48	30 x 30
Turn and Curve Signs	W1-1,2,3,4	6F.16	36 x 36	48 x 48	30 x 30
Reverse Curve (2 or more lanes)	W1-4b,4c	6F.48	36 x 36	48 x 48	---
One-Direction Large Arrow	W1-6	6F.16	48 x 24	60 x 30	---
Chevron Alignment	W1-8	6F.16	18 x 24	30 x 36	30 x 30
Double Reverse Curve (1 lane)	W1-X1	6F.49	36 x 36	48 x 48	---
Double Reverse Curve (2 lanes)	W1-X1b	6F.49	---	48 x 48	---
Stop Ahead	W3-1	6F.16	36 x 36	48 x 48	30 x 30
Yield Ahead	W3-2	6F.16	36 x 36	48 x 48	30 x 30
Signal Ahead	W3-3	6F.16	36 x 36	48 x 48	30 x 30
Be Prepared to Stop	W3-4	6F.16	36 x 36	48 x 48	30 x 30

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

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

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

Sign or Plaque	Sign Designation	Section	Conventional Road	Freeway or Expressway	Minimum
Reduced Speed Ahead	W3-5	6F.16	36 x 36	48 x 48	30 x 30
XX MPH Speed Zone Ahead	W3-5a	6F.16	36 x 36	48 x 48	30 x 30
Traffic Control Change Ahead	W3-X5	6F.30	36 x 36	48 x 48	30 x 30
Merging traffic	W4-1,1a,5	6F.16	36 x 36	48 x 48	36 x 36
Lane Ends	W4-2	6F.24	36 x 36	48 x 48	30 x 30
Added Lane	W4-3,6	6F.16	36 x 36	48 x 48	30 x 30
No Merge Area (plaque)	W4-5P	6F.16	18 x 24	24 x 30	---
Road Narrows	W5-1	6F.16	36 x 36	48 x 48	30 x 30
Narrow Bridge	W5-2	6F.16	36 x 36	48 x 48	30 x 30
One Lane Bridge	W5-3	6F.16	36 x 36	48 x 48	30 x 30
Ramp Narrows	W5-4	6F.26	36 x 36	48 x 48	30 x 30
Divided Highway	W6-1	6F.16	36 x 36	48 x 48	30 x 30
Divided highway Ends	W6-2	6F.16	36 x 36	48 x 48	30 x 30
Two-Way Traffic	W6-3	6F.32	36 x 36	48 x 48	30 x 30
Two-Way Traffic	W6-4	6F.76	12 x 18	12 x 18	---
Hill (symbol)	W7-1	6F.16	36 x 36	48 x 48	30 x 30
Next XX Miles (plaque)	W7-3aP	6F.53	24 x 18	36 x 30	---
Bump	W8-1,1a	6F.16	36 x 36	48 x 48	30 x 30
Dip	W8-2	6F.16	36 x 36	48 x 48	30 x 30
Pavement Ends	W8-3	6F.16	36 x 36	48 x 48	30 x 30
Soft Shoulder	W8-4	6F.44	36 x 36	48 x 48	30 x 30
Slippery When Wet	W8-5	6F.16	36 x 36	48 x 48	30 x 30
Truck Crossing	W8-6	6F.36	36 x 36	48 x 48	30 x 30
Loose Gravel	W8-7	6F.16	36 x 36	48 x 48	30 x 30
Rough Road	W8-8	6F.16	36 x 36	48 x 48	30 x 30
Low Shoulder	W8-9	6F.44	36 x 36	48 x 48	30 x 30
Shoulder Drop-Off	W8-9a	6F.44.1	36 x 36	48 x 48	30 x 30
Uneven Lanes	W8-11	6F.45	36 x 36	48 x 48	30 x 30
No Center Stripe	W8-12a	6F.47	36 x 36	48 x 48	30 x 30
Fallen Rocks	W8-14	6F.16	36 x 36	48 x 48	30 x 30
Grooved Pavement	W8-15	6F.16	36 x 36	48 x 48	30 x 30
Motorcycle (plaque)	W8-15P	6F.54	24 x 18	30 x 24	---
Road May Flood	W8-18	6F.44	36 x 36	48 x 48	30 x 30
No Shoulder	W8-23	6F.44	36 x 36	48 x 48	30 x 30
Steel Plate Ahead	W8-24	6F.46	36 x 36	48 x 48	30 x 30
Shoulder Ends	W8-25	6F.16	36 x 36	48 x 48	30 x 30
Lane Ends	W9-1,2	6F.16	36 x 36	48 x 48	30 x 30
Grade Crossing Advance Warning	W10-1	6F.16	36 Diameter	---	---
Truck	W11-10	6F.36	36 x 36	48 x 48	30 x 30
Double Arrow	W12-1	6F.16	30 x 30	---	---
Low Clearance	W12-2	6F.16	36 x 36	48 x 48	30 x 30
Advisory Speed (plaque)	W13-1P	6F.52	24 x 24	30 x 30	18 x 18
On Ramp (plaque)	W13-4P	6F.25	36 x 36	36 x 36	---
No Passing Zone (pennant)	W14-3	6F.16	48 x 48 x 48	64 x 64 x 48	40 x 40 x 30
Emergency Scene Ahead	W14-X15	6I.1	36 x 36	48 x 48	---
XX Feet (plaque)	W16-2P	6F.16	24 x 18	30 x 24	---
Road Work Ahead	W20-1	6F.18	36 x 36	48 x 48	30 x 30

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

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

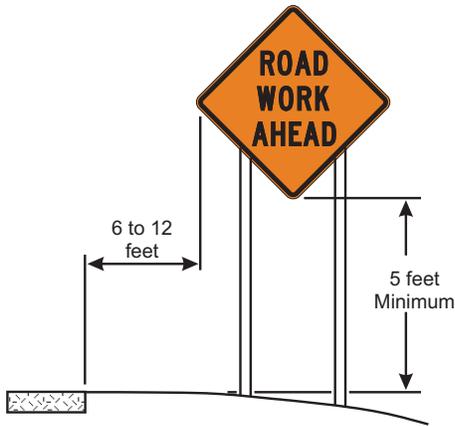
Table 6F-1 Temporary Traffic Control Zone Sign and Plaque Sizes (Sheet 2 of 3)

Sign or Plaque	Sign Designation	Section	Conventional Road	Freeway or Expressway	Minimum
Detour Ahead	W20-2	6F.19	36 x 36	48 x 48	30 x 30
Road (Street) Closed Ahead	W20-3	6F.20	36 x 36	48 x 48	30 x 30
Trail Closed Ahead	W20-3a	6F.20.1	18 x 18	---	---
One Lane Road Ahead	W20-4	6F.21	36 x 36	48 x 48	30 x 30
Flagger (symbol)	W20-7	6F.31	36 x 36	48 x 48	30 x 30
Slow (on Stop/Slow Paddle)	W20-8	6F.3	18 x 18	---	---
Merge	W20-X3	6F.24.1	36 x 36	48 x 48	30 x 30
Bypass Ahead	W20-X6	6F.16	36 x 36	48 x 48	30 x 30
Narrow Lane (width shown)	W20-X11	6F.16	36 x 36	48 x 48	30 x 30
Right Two Lanes Closed	W20-X13	6F.22	36 x 36	48 x 48	30 x 30
Lanes Narrow	W20-X17	6F.16	36 x 36	48 x 48	30 x 30
Workers	W21-1	6F.33	36 x 36	48 x 48	30 x 30
Fresh Oil (Tar)	W21-2	6F.34	36 x 36	48 x 48	30 x 30
Road Machinery Ahead	W21-3	6F.35	36 x 36	48 x 48	30 x 30
Slow Moving Vehicle	W21-4	6G.6	36 x 18	---	---
Shoulder Work	W21-5	6F.37	36 x 36	48 x 48	30 x 30
Shoulder Closed	W21-5a	6F.37	36 x 36	48 x 48	30 x 30
Survey Crew	W21-6,6a	6F.38	36 x 36	48 x 48	30 x 30
Utility Work Ahead	W21-7	6F.39	36 x 36	48 x 48	30 x 30
Mowing Ahead	W21-8	6G.6	36 x 36	48 x 48	30 x 30
No Shoulder	W21-X1	6F.44.3	36 x 36	48 x 48	30 x 30
Right (Left Lane Closed)	W21-X5	6F.22	36 x 36	48 x 48	30 x 30
Center Lane Closed	W21-X5c	6F.23	36 x 36	48 x 48	30 x 30
Right (Left) Two Lanes Closed	W21-X6	6F.38.1	36 x 36	48 x 48	30 x 30
High Shoulder	W21-X9	6F.44.2	36 x 36	48 x 48	30 x 30
Blasting Zone Ahead	W22-1	6F.41	36 x 36	48 x 48	30 x 30
Turn Off 2-Way Radio & Cell Phone	W22-2	6F.42	42 x 36	42 x 36	---
End Blasting Zone	W22-3	6F.43	42 x 36	42 x 36	36 x 30
Slow Traffic Ahead	W23-1	6F.27	48 x 24	48 x 24	---
New Traffic Pattern Ahead	W23-2	6F.30	36 x 36	48 x 48	30 x 30
All Lanes	W24-1cP	6F.49	24 x 24	30 x 30	---
Road Work Next XX Miles	G20-1	6F.56	36 x 18	48 x 24	---
End Road Work	G20-2	6F.57	36 x 18	48 x 24	---
Pilot Car Follow Me	G20-4	6F.58	36 x 18	---	---
Work Zone (plaque)	G20-5aP	6F.12	24 x 18	36 x 24	---
Road Closed Beginning XXXX XX	G20-X1	6F.56.1	72 x 60	90 x 78	---
Exit Open	E5-2	6F.28	48 x 36	48 x 36	---
Exit Closed	E5-2a	6F.28	48 x 36	48 x 36	---
Exit Only	E5-3	6F.29	48 x 36	48 x 36	---
Detour	M4-8	6F.59	24 x 12	30 x 15	---
End Detour	M4-8a	6F.59	24 x 18	24 x 18	---
End	M4-8b	6F.59	24 x 12	24 x 12	---
Detour	M4-9	6F.59	30 x 24	48 x 36	---
Bike/Pedestrian	M4-9a	6F.59	30 x 24	---	---
Pedestrian Detour	M4-9b	6F.59	30 x 24	---	---
Bike Detour	M4-9c	6F.59	30 x 24	---	---
Detour	M4-10	6F.59	48 x 18	---	---

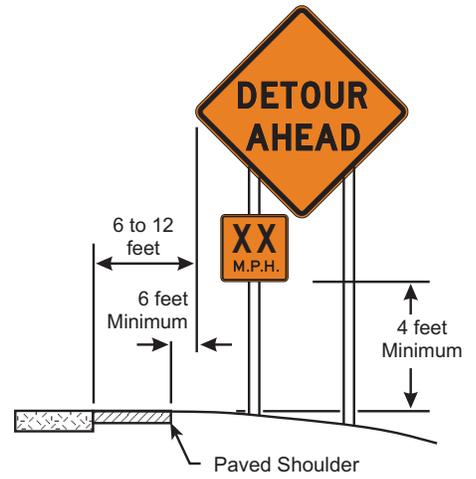
* See Table 2B-1 for minimum size required for signs facing traffic on multi-lane conventional roads

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

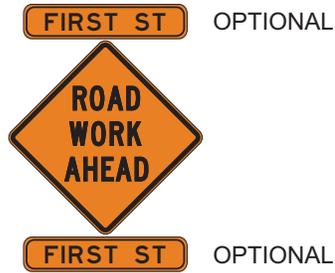
Table 6F-1 Temporary Traffic Control Zone Sign and Plaque Sizes (Sheet 3 of 3)



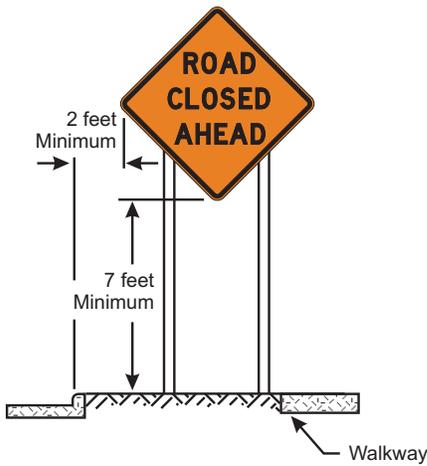
A. RURAL AREA



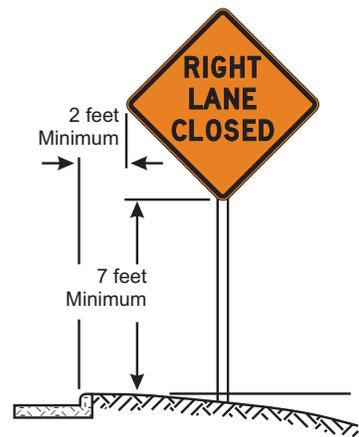
B. RURAL AREA WITH ADVISORY SPEED PLATE



Advance street name plaques or route markers may be installed above or below warning signs



C. BUSINESS, COMMERCIAL, OR RESIDENTIAL AREA



D. BUSINESS, COMMERCIAL, OR RESIDENTIAL AREA (WITHOUT CURB)

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

GUIDANCE:

Neither portable nor permanent sign supports should be located on sidewalks, bicycle facilities, or areas designated for pedestrian or bicycle traffic. If the bottom of a secondary sign that is mounted below another sign is mounted lower than 7 feet above a pedestrian sidewalk or pathway (see Section 6D.2), the secondary sign should not project more than 4 inches into the pedestrian facility.

STANDARD:

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)

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

GUIDANCE:

Except as provided in the following Option, signs anticipated to be in one place for more than 30 days should not be mounted on portable supports. Whenever this anticipated time period changes, signs mounted on portable supports should be re-evaluated.

OPTION:

Signs, whose location on a paved surfaces is necessary, may be mounted on portable supports for more than 30 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:

All sign supports shall be crashworthy.

Where large signs having an area exceeding 50 square feet are installed on multiple breakaway posts, the clearance from the ground to the bottom of the sign shall be at least 7 feet.

The bottom of a sign mounted on a barricade, or other portable support, shall be at least 1 foot above the traveled way.

In addition, regulatory signs installed on barricades or other portable supports shall be installed so that the center of the sign or sign assembly is at least 4 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.

SUPPORT:

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

6F.4 Sign Maintenance

GUIDANCE:

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

Signs that have lost significant legibility shall be replaced as soon as possible after notification.

SUPPORT:

Section 2A.8 contains information regarding the retroreflectivity of signs, including the signs that are used in TTC zones.

6F.5 Regulatory Sign Authority

SUPPORT:

Regulatory signs inform road users of traffic laws or regulations and indicate the applicability of legal requirements that would not otherwise be apparent.

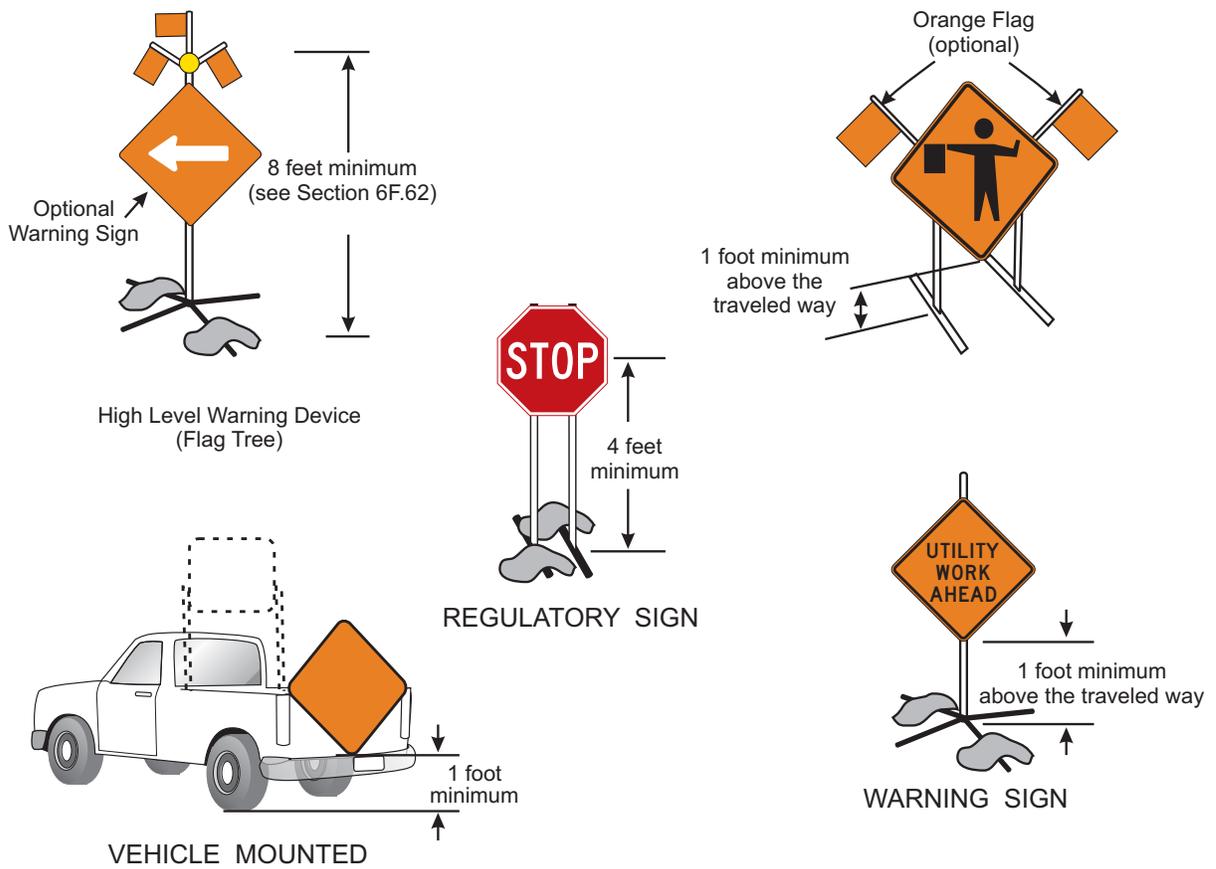
STANDARD:

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

6F.6 Regulatory Sign Design

STANDARD:

TTC regulatory signs shall comply with the Standards for regulatory signs presented in Part 2 and in the Mn/DOT Standard Signs Manual and the FHWA "Standard Highway Signs and Markings" book (see Section 1A.11).



PORTABLE AND TEMPORARY MOUNTINGS

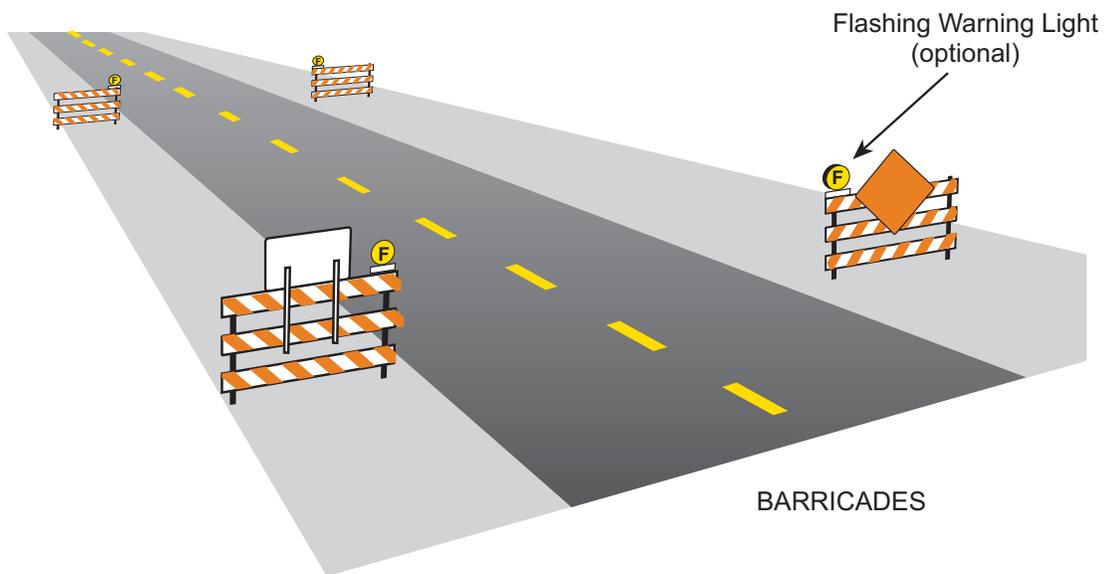


Figure 6F-2 Methods of Mounting Signs Other Than on Posts

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

OPTION:

The RAMP NARROWS (W5-4) sign may 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.



W5-4



W23-1

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

OPTION:

The SLOW TRAFFIC AHEAD (W23-1) sign 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 WORK (W20-1) sign may also be used with the SLOW TRAFFIC AHEAD sign.

6F.28 EXIT OPEN, EXIT CLOSED Signs (E5-2, E5-2a)



E5-2



E5-2a

OPTION:

An EXIT OPEN (E5-2) or EXIT CLOSED (E5-2a) sign 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/inter-section guide signs.

6F.29 EXIT ONLY Sign (E5-3)



E5-3

OPTION:

An EXIT ONLY (E5-3) sign 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 vehicular traffic using the ramp is different from the normal condition.

6F.30 NEW TRAFFIC PATTERN AHEAD, TRAFFIC CONTROL CHANGE AHEAD Signs (W23-2, W3-X5)



W23-2



W3-X5

OPTION:

A NEW TRAFFIC PATTERN AHEAD (W23-2) or TRAFFIC CONTROL CHANGE AHEAD sign (W3-X5) may be used on the approach to an intersection or along a section of roadway to provide advance warning of a change in traffic patterns, such as revised lane usage, roadway geometry, or signal phasing.

GUIDANCE:

To retain its effectiveness, the W23-2 or W3-X5 sign should be displayed for up to 2 weeks, and then it should be covered or removed until it is needed again.

6F.31 Flagger Sign (W20-7)



W20-7

GUIDANCE:

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

STANDARD:

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

6F.32 Two-Way Traffic Sign (W6-3)



W6-3

GUIDANCE:

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

OPTION:

When the lateral space between lanes is restricted, the Two-Way Traffic sign (W6-3) may be replaced with the Opposing Traffic Lane Divider (W6-4).

6F.33 Workers Sign (W21-1)



W21-1

OPTION:

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

6F.34 FRESH OIL (TAR) Sign (W21-2)

GUIDANCE:

The FRESH OIL (TAR) (W21-2) sign should be used to warn road users of the surface treatment.



W21-2



W21-3

6F.35 ROAD MACHINERY AHEAD Sign (W21-3)

OPTION:

The ROAD MACHINERY AHEAD (W21-3) sign may be used to warn of machinery operating in or adjacent to the roadway.

6F.36 Motorized Traffic Signs (W8-6, W11-10)



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 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.

6F.37 SHOULDER WORK Signs (W21-5, W21-5a)



W21-5

W21-5a

SUPPORT:

Shoulder Work signs 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 FT or AHEAD (W21-5b).

OPTION:

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

GUIDANCE:

On freeways and expressways, the RIGHT (LEFT) SHOULDER CLOSED XXX 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.

6F.38 SURVEY CREW Sign (W21-6a)

GUIDANCE:

The SURVEY CREW AHEAD (W21-6a) sign should be used to warn of surveying crews working in or adjacent to the roadway.



W21-6a

W21-X6"

6F.38.1 CREW WORKING AHEAD Sign (W21-X6)

GUIDANCE:

The CREW WORKING AHEAD sign (W21-X6) should be used for short duration activities being done on or off the roadway for such thing as filming, surveying, tree trimming road inspection, lighting, signal work, utility work, and other activities where a crew is visible to traffic.

OPTION:

The CREW WORKING AHEAD sign (W21-X6) may be used in place of the SURVEY CREW AHEAD sign (W21-6).

6F.39 UTILITY WORK AHEAD Sign (W21-7)



W21-7

OPTION:

The UTILITY WORK (W21-7) sign 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 Chapter 6K (*the Field Manual*), Layouts 6K-3, 6K-9, 6K-13, 6K-22, 6K-28, 6K-40, and 6K-51.

STANDARD:

The UTILITY WORK sign shall carry the legend UTILITY WORK, XX FT, XX MILES, or AHEAD.

6F.40 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.

6F.41 BLASTING ZONE AHEAD Sign (W22-1)



W22-1

STANDARD:

The BLASTING ZONE AHEAD (W22-1) sign 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.

6F.42 TURN OFF 2-WAY RADIO AND CELLULAR PHONE Sign (W22-2)

STANDARD:

The TURN OFF 2-WAY RADIO AND CELLULAR PHONE (W22-2) sign shall follow the BLASTING ZONE AHEAD sign and shall be placed at least 1,000 feet before the beginning of the blasting zone.



W22-2



W22-3

6F.43 END BLASTING ZONE Sign (W22-3)

STANDARD:

The END BLASTING ZONE (W22-3) sign shall be placed a minimum of 1,000 feet past the blasting zone.

OPTION:

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

6F.44 Shoulder Signs

SUPPORT:

The signs in the following sections are to be used as described.

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6F.44.1 SHOULDER DROP OFF Sign (W8-9a)



W8-9a

STANDARD:

The SHOULDER DROP-OFF (W8-9a) sign shall be used when a shoulder drop-off, adjacent to the travel lane, exceeds 2 inches in depth and is not protected by portable barriers and the LOW SHOULDER sign (W8-9) is not used.

6F.44.2 LOW SHOULDER Sign (W8-9) HIGH SHOULDER (W21-X9)



W8-9



W21-X9

STANDARD:

The LOW SHOULDER sign (W8-9) and the HIGH SHOULDER sign (W21-X9) shall be used for a shoulder drop-off or rise in accordance with the guidelines shown in Figure 6K-3 on page 6K-xxi.

6F.44.3 NO SHOULDER Sign (W21-X1)



W21-X1

STANDARD:

The NO SHOULDER sign (W21-X1) shall be used for a shoulder drop-off in accordance with the guidelines shown in Figure 6K-5 and 6K-6 on pages 6K-xxii and 6K-xxiii.

6F.44.4 SOFT SHOULDER Sign (W8-4)

OPTION:

The SOFT SHOULDER sign (W8-4) may be used for a shoulder drop-off between 2 and 4 inches in height and the edge has been tapered and compacted at a rate of 6:1 so that a vehicle may safely drive on it.



W8-4



W8-11

6F.45 UNEVEN LANES Sign (W8-11)

STANDARD:

The UNEVEN LANES (W8-11) sign shall be used in accordance with the guidelines shown in Figure 6-3 on page xxi.

GUIDANCE:

The UNEVEN LANES (W8-11) sign should be used during operations that create a difference in elevation between adjacent lanes that are open to travel.

6F.46 STEEL PLATE AHEAD Sign (W8-24)



W8-24

OPTION:

A STEEL PLATE AHEAD (W8-24) sign may be used to warn road users that the presence of a temporary steel plate(s) might make the road surface uneven and might create slippery conditions during wet weather.

6F.47 NO CENTER STRIPE Sign (W8-12a)



W8-12a

STANDARD:

The NO CENTER STRIPE (W8-12a) sign shall be used as detailed in Section 6F.78.

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GUIDANCE:

This sign should also be used at major connection, traffic generators, and/or at appropriate intervals to advise motorists entering the zone.

6F.48 Reverse Curve Signs (W1-4 Series)



W1-4



W1-4b



W1-4c

GUIDANCE:

In order to give road users advance notice of a lane shift, a Reverse Curve (W1-4, W1-4b, or W1-4c) sign (see Figure 6F-4) should be used when a lane (or lanes) is being shifted to the left or right. If the design speed of the curves is 30 mph or less, a Reverse Turn (W1-3) sign should be used.

STANDARD:

If a Reverse Curve (or Turn) sign is used, the direction of the reverse curve (or turn) symbol shall be consistent with the desired vehicle path. Except as provided in the following Option, the number of lanes illustrated on the sign shall be the same as the number of through lanes available to road users.

OPTION:

Where two or more lanes are being shifted, a W1-4 (or W1-3) sign with an ALL LANES (W24-1cP) plaque (see Figure 6F-4) may be used instead of a sign that illustrates the number of lanes.

Where more than three lanes are being shifted, the Reverse Curve (or Turn) sign may be rectangular.

6F.49 Double Reverse Curve Signs (W1-X1, W1-X1b)



W1-X1



W1-X1a

OPTION:

The Double Reverse Curve (W1-X1, W1-X1b) sign may be used where the tangent distance between two reverse curves is less than 600 feet, thus making it difficult for a second Reverse Curve (W1-4 series) sign to be placed between the curves. If the design speed of the curves is 30 mph or less, Double Reverse Turn signs should be used.

STANDARD:

If a Double Reverse Curve (or Turn) sign is used, the direction of the double reverse curve (or turn) symbol shall be consistent with the desired vehicle path. Except as provided in the first paragraph of the following Option, the number of lanes illustrated on the sign shall be the same as the number of through lanes available to road users.

OPTION:

Where two or more lanes are being shifted, a W1-X1 (or Double Reverse Turn sign showing one lane) sign with an ALL LANES (W24-1cP) plaque may be used instead of a sign that illustrates the number of lanes.

Where more than three lanes are being shifted, the Double Reverse Curve (or Turn) sign may be rectangular.

6F.50 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 provided in Section 6F.02, other warning signs that are used in TTC zones shall have black legends and borders on an orange background.



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Figure 6F-4 Other Warning Signs That May be Found in Temporary Traffic Control Zones

6F.50.1 BUMP and DIP Signs (W8-1, W8-2)



W8-1



W8-2

SUPPORT:

The BUMP and DIP signs (W8-1, W8-2) are intended for use to give warning of a sharp rise or depression in the profile of the road that is sufficiently abrupt to create a hazardous condition to cause considerable discomfort to passengers, to cause a shifting of cargo, or to deflect a vehicle from its true course at the normal driving speed for the road.

OPTION:

It may be desirable at some locations to supplement these signs with an Advisory Speed plaque (W13-1).

STANDARD:

The DIP sign (W8-2) shall not be used at a short stretch of depressed alignment that may momentarily hide a vehicle. Such a condition shall be treated as a no-passing zone (see Section 3B-3 to 5).

Only one supplemental plaque shall be permitted beneath each sign.

GUIDANCE:

The use of a flashing beacon or orange flag is discretionary depending on the severity of the bump or dip. When used, they should be mounted on the advance sign assembly.

At less severe or multiple bumps, a BUMP AHEAD (W8-1a) or BUMPS (W8-1b) sign should be placed an adequate distance in advance of the site(s) to ensure that a motorist has sufficient warning before arriving at the location. An appropriate distance plaque, XXX FEET (W20-100p) or NEXT XX MILES (W7-3a) should be placed below the warning sign.



W8-1a



W8-1a

At the site of each severe bump or dip, a "down arrow" should be added to the sign face to identify the exact location of the bump or dip.

When there are multiple bumps of lesser severity or pavement breaks for a distance in excess of one mile, the ROUGH ROAD sign (W8-8) should be used.



W8-8



W7-3aP

OPTION:

The NEXT XX MILES (W7-3aP) may be used below the ROUGH ROAD sign (W8-8).

6F.50.2 BE PREPARED TO STOP Sign (W3-4)



W3-4

OPTION:

The BE PREPARED TO STOP sign (W3-4) may be used in advance of conditions that may require the driver to stop.

SUPPORT:

The BE PREPARED TO STOP sign (W3-4) is usually used in conjunction with the FLAGGER AHEAD sign (W20-7a).

6F.51 Special Warning Signs

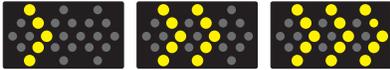
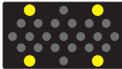
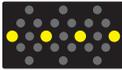
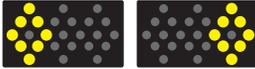
OPTION:

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.

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.

- | Operating Mode | Panel Display * |
|---|--|
| 1. At least one of the following two modes shall be provided: | (Right arrow is shown, left arrow is similar) |
| Flashing Arrow | 
Move/Merge Right |
| Sequential Arrow | 
Move/Merge Right |
| Sequential Chevron | 
Move/Merge Right |
| 2. The following mode shall be provided: | 
Move/Merge Right or Left |
| 3. At least one of the following three modes shall be provided: | |
| Flashing Four Corners |  |
| Flashing Bar |  |
| Alternating Flashing Diamonds | 
Caution |

* Element layout for Type C panel shown

Panel Type	Minimum Size inches	Minimum Legibility Distance miles	Minimum Number of Elements	Recommended Usage
A	48 x 24	0.5	12	Low speed streets
B	60 x 30	0.75	13	Conventional roadways
C	96 x 48	1.0	15	Freeways and Expressways

Arrow Stick 
Arrow Sticks may supplement other TTC devices, but shall not be used in place of arrow boards

Advance Warning Arrow Board Specifications

Figure 6F-6 Advance Warning Arrow Display Specifications

STANDARD:

Type A, B, and C arrow boards shall have solid rectangular appearances. A Type D arrow board shall conform to the shape of the arrow.

All arrow boards shall be finished in non-reflective black. The arrow board shall be mounted on a vehicle, a trailer, or other suitable support.

GUIDANCE:

The minimum mounting height, measured vertically from the bottom of the board to the roadway below it or to the elevation of the near edge of the roadway, of an arrow board should be 7 feet, except on vehicle-mounted arrow boards, which should be no lower than 3 feet.

A vehicle-mounted arrow board should be provided with remote controls.

STANDARD:

Arrow board 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 boards.

GUIDANCE:

Full brilliance should be used for daytime operation of arrow boards.

STANDARD:

The arrow board shall have suitable elements capable of the various operating modes. The color presented by the elements shall be yellow.

GUIDANCE:

If an arrow board 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 board shall have the following three mode selections:

- A. A Flashing Arrow, or Sequential Arrow, or Sequential Chevron mode;
- B. A flashing Double Arrow mode; and
- C. A flashing Caution or Alternating Diamond mode.

An arrow board 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 board shall be used only in the caution mode.

GUIDANCE:

For a stationary lane closure, the arrow board should be located on the shoulder at the beginning of the merging taper.

Where the shoulder is narrow, the arrow board should be located in the closed lane.

STANDARD:

When arrow boards are used to close multiple lanes, a separate arrow board shall be used for each closed lane.

GUIDANCE:

When arrow boards are used to close multiple lanes, if the first arrow board is placed on the shoulder, the second arrow board should be placed in the first closed lane at the upstream end of the second merging taper (see Figure 6H-37). When the first arrow board is placed in the first closed lane, the second arrow board 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 board 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 board shall be equipped with high-intensity rotating, flashing, oscillating, or strobe lights.

Arrow boards shall only be used to indicate a lane closure. Arrow boards shall not be used to indicate a lane shift.

OPTION:

A portable changeable message sign may be used to simulate an arrow board display.

6F.62 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.

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 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.

6F.68 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.

Barricades are classified as Type I, Type II, or Type III. (see Figure 6F-7)

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 following Option, the stripes shall be 6 inches wide.

OPTION:

When rail lengths are less than 36 inches, 4-inch wide stripes may be used.

STANDARD:

The minimum length for Type I and Type II Barricades shall be 24 inches and the minimum length for Type III Barricades shall be 48 inches. Each barricade rail shall be 8 to 12 inches wide. Barricades used on expressways, freeways and other high-speed roadways shall have a minimum of 270 square inches of retroreflective area facing 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 60 inches throughout the entire length of the pedestrian pathway, a 60 x 60-inch passing space should be provided at least every 200 feet to allow individuals in wheelchairs to pass.

Barricade rail supports should not project into pedestrian circulation routes more than 4 inches from the support between 27 and 80 inches 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).

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OPTION:

For Type I Barricades, the support may include other unstriped horizontal panels necessary to provide stability.

GUIDANCE:

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 non-deformable objects such as rocks or chunks of concrete. Ballast shall not extend into the accessible passage width of 60 inches.

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 to ensure proper closure at the end of each workday.

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:

When a highway is legally closed but access must still be allowed for local traffic, a sign shall be installed with the appropriate legend concerning permissible use by local road users (see Section 6F.9). Adequate visibility of the barricades from both directions shall be provided by;

1. installing retroreflective sheeting on both sides of the barricade boards; or
2. by installing barricade boards back-to-back on the barricade.

OPTION:

Signs may be installed on barricades (see Section 6F.3).

6F.69 Direction Indicator Barricades**STANDARD:**

The Direction Indicator Barricade shall consist of a retroreflective One-Direction Large Arrow (W1-6) sign mounted above a diagonal striped, horizontally aligned, retroreflective rail (see Figure 6F-7).

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 4 inches wide. The One-Direction Large Arrow (W1-6) sign shall be 24 x 12 inches. The bottom rail shall have a length of 24 inches and a height of 8 inches.

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.

6F.70 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 (see Section 6F.85) shall not be used solely to channelize road users, but also to protect the work space. 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.

STANDARD:

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.

GUIDANCE:

When used for channelization, temporary traffic barriers should be of a light color for increased visibility.

6F.77 Pavement Markings

SUPPORT:

Pavement markings are installed or existing markings are maintained or enhanced in TTC zones to provide road users with a clearly defined path for travel through the TTC zone in day, night, and twilight periods under both wet and dry pavement conditions.

GUIDANCE:

The work should be planned and staged to provide for the placement and removal of the pavement markings in a way that minimizes the disruption to traffic flow approaching and through the TTC zone during the placement and removal process.

STANDARD:

Existing pavement markings shall be maintained in all long-term stationary (see Section 6G.2) TTC zones in accordance with Chapters 3A and 3B, except as otherwise provided for temporary pavement markings in Section 6F.78. Pavement markings shall match the alignment of the markings in place at both ends of the TTC zone. Pavement markings shall be placed along the entire length of any paved detour or temporary roadway prior to the detour or roadway being opened to road users.

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 remove the non-applicable pavement marking material, and the obliteration method shall minimize pavement scarring. Painting over existing pavement markings with black paint or spraying with asphalt shall not be accepted as a substitute for removal or obliteration.

OPTION:

Removable, non-reflective, preformed tape that is approximately the same color as the pavement surface may be used where markings need to be covered temporarily.

6F.78 Interim Pavement Markings

SUPPORT:

Interim 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:

Interim pavement markings should not be in place for more than 14 calendar days unless justified by an engineering study.

White lane lines and yellow centerlines, including no passing zones should be installed before opening the roadway to traffic. If it is not possible or practical to install these markings before opening the roadway to traffic the interim markings should be installed at the end of each working day or provided by signing in accordance with the provisions of this section.

GUIDANCE:

The temporary use of edge lines, channelizing lines, lane reduction transitions, gore markings, and other longitudinal markings, and the various non-longitudinal 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:

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.

Except as otherwise provided in this Section, all interim pavement markings for no-passing zones shall comply with the requirements of Chapters 3A and 3B. All interim broken-line pavement markings shall use the same cycle length as permanent markings and shall have line segments that are at least 2 feet long.

GUIDANCE:

All pavement markings and devices used to delineate road user paths should be reviewed during daytime and nighttime periods.

OPTION:

Half-cycle lengths with a minimum of 2-foot stripes may be used on roadways with severe curvature (see Section 3A.6) for broken line center lines in passing zones and for lane lines.

For temporary situations of 14 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.28, 2B.29, and 2C.45) 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.

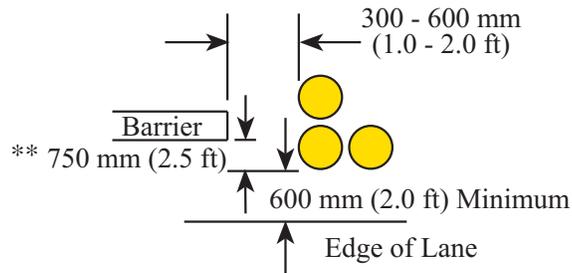
GUIDANCE:

If used, the DO NOT PASS, PASS WITH CARE, and NO PASSING ZONE signs should be placed in accordance with Sections 2B.28, 2B.29, and 2C.45.

If used, the NO CENTER STRIPE sign should be placed in accordance with Section 6F.47.

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Sand Barrel Offset



** Distance may be reduced to a minimum of 380 mm (1.25 ft). This is acceptable only where a greater offset would cause unacceptable interference with traffic.

Shoulder Fill

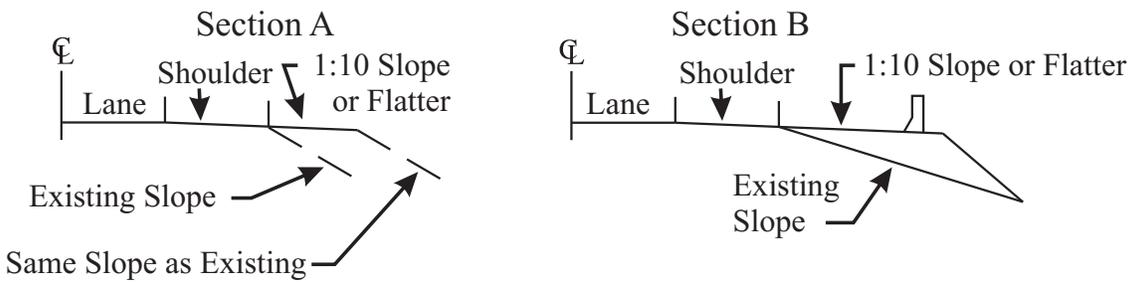
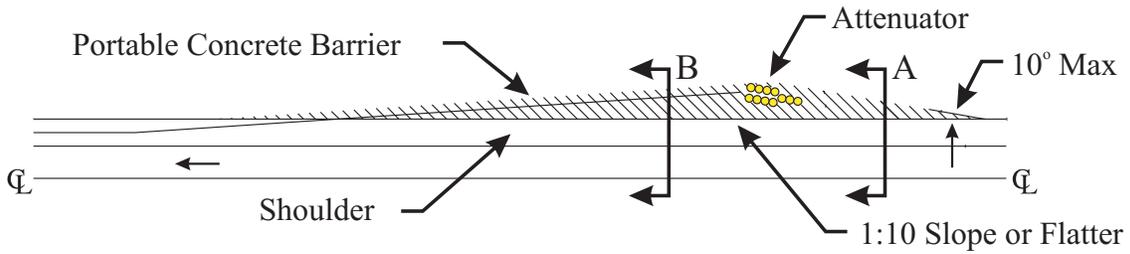


Figure 6F-9 Portable Concrete Barrier Placement and End treatments

(Sheet 2 of 2)

6F.86 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. More detailed information on the use of portable barriers and crash cushions can be obtained from Figure 6F-9.

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 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. (see Chapter Part 6K-Temporary Traffic Control Zone Layouts for the recommended distance charts)

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.

6F.87 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, black, or orange.

OPTION:

Intervals between 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 rumble strip installation.

PART 6. TEMPORARY TRAFFIC CONTROL

Chapter 6G. Type of Temporary Traffic Control Zone Activities

6G.a Introduction

SUPPORT:

The purpose of temporary traffic control is to balance the need for safe and effective work spaces with the need to warn, control, protect, and expedite vehicular and pedestrian traffic. To accomplish this, the respect of the driver must be earned by appropriate and prudent use of traffic control devices. Proper engineering judgment is the key factor in making the temporary traffic control zone both safe and efficient.

GUIDANCE:

Advance planning is necessary for any successful temporary traffic control zone. Before setting up any zone, the appropriate layout and number of devices must be determined. Any major changes from the typical layouts should be documented. For major projects, emergency operation plans should be developed in the event of a total road closure.

OPTION:

Important aspects of the planning stage include consideration of alternate routes and the use of public information.

STANDARD:

It is essential to notify emergency services (i.e. police, fire, etc.) of any road closures and route changes.

SUPPORT:

In this chapter, the factors which affect the selection of the typical temporary traffic control zone layouts are explained. Chapter 6H details the layouts which are found in Chapter 6J, Traffic Control for Long Term Temporary Traffic Control Zones and in Chapter 6K Short Term Temporary Traffic Control Zones (*the Field Manual*).

STANDARD:

For most projects, especially long term projects, it will be necessary to prepare a project specific Traffic Control Plan (TCP). A TCP may range from a reference to Chapter 6K (the Field Manual) to a detailed set of plans and specifications.

GUIDANCE:

In developing any TCP the following items should be considered:

- A. Suitable detours
 - Weight, height and width restrictions
 - Capacity
 - Geometrics
 - Maintenance of the detour
- B. Access and signage to businesses
- C. Conflict with standard routes and accommodations for:
 - School buses
 - Public transit
 - Fire
 - Ambulance
 - Postal Service
- D. Restriction of capacity during peak hours
- E. Alternate routes and other construction and/or maintenance activities in the area that may affect alternate routes.
- F. Restrictions on overweight, overheight and overwidth permits
- G. Inplace signing, lighting and signal modifications
- H. Trail crossings, pedestrians, bicyclists
- I. Utility work
- J. Special events, holidays, etc.
- K. Local ordinances

6G.1 Typical Applications

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. A TTC zone includes the section of roadway between the first advance warning sign through the last traffic control device, where traffic returns to its normal path and conditions. 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 layouts include a variety of temporary traffic control methods, but do not include a layout for every conceivable work situation.

Well-designed TTC plans for planned special events will likely be developed from a combination of treatments from several of the typical applications.

GUIDANCE:

For any planned special event that will have an impact on the traffic on any street or highway, a TTC plan should be developed in conjunction with and be approved by the agency or agencies that have jurisdiction over the affected roadways.

Typical applications should be altered, when necessary, to fit the conditions of a particular TTC zone. When modifications are made, factors such as traffic volume, speed, sight distance, type of work, etc. should be considered.

OPTION:

The typical layouts illustrated in Chapter 6K (*the Field Manual*) generally represent typical highway agency activities. Other devices may be added to supplement the devices shown in the typical layouts, while others may be deleted. Sign spacings and taper lengths may be increased to provide additional time or space for driver response. In some situations, however, such as an urban setting, too many devices can spread signing over too long a distance to be fully effective.

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. When conditions are less complex than those depicted in the typical applications, fewer devices may be needed.

SUPPORT:

Selecting the most appropriate typical layout and modifications for a TTC zone requires knowledge and understanding of the zone. Although there are many ways of categorizing temporary traffic control zone layouts, roadway type, location of the work, volume, duration of work, and speed have been used to characterize the typical drawings illustrated in Chapter 6K (*the Field Manual*).

6G.2 Work Duration**SUPPORT:**

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 are as follows:

- A. Long-term TTC zone - any temporary traffic control zone that occupies a location more than 3 days.
- B. Intermediate-term/night TTC zone - any TTC zone that occupies a location during hours of darkness or up to 3 days.
- C. Short-term TTC zone - any TTC zone that occupies a location for less than twelve (12) hours.
- D. Short duration TTC zone - any TTC zone that occupies a location (area) for less than one (1) hour.
- E. Mobile TTC zone - any TTC zone that occupies a location (area) for less than fifteen (15) minutes.

6G.2.1 Long-Term Temporary Traffic Control Zone**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. Larger channelizing devices have more retroreflective material and offer better nighttime visibility. The larger devices are also less likely to be displaced or tipped over-an important consideration during those periods when the work crew is not present.

STANDARD:

Since long-term operations extend into nighttime, retroreflective and/or illuminated devices shall be used in long-term stationary TTC zones.

GUIDANCE:

Temporary roadways and barriers may be provided, and inappropriate markings should be removed and replaced with temporary markings. Temporary signs should be post-mounted.

STANDARD:

Any conflicting signs shall be covered.

OPTION:

A long-term TTC zone may range in duration from several days to several years.

GUIDANCE:

Traffic control procedures and devices should be chosen to accommodate the varying seasonal, climactic and visibility situations that may arise during the length of the project. Consideration should also be given to devices that are durable and easily maintained.

PART 7. TRAFFIC CONTROLS FOR SCHOOL AREAS

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Part 7. TRAFFIC CONTROLS FOR SCHOOL AREAS

7B. Signs

7B.1 Size of School Signs

STANDARD:

Detailed drawings of the standard signs illustrated in this Manual can be found in the Minnesota Standard Signs Manual (see Map & Manual Sales Unit, page ii). Other questions regarding signs and their usage can be referred to the Office of Traffic, Safety and Technology (see page ii). The size of signs to be used in school areas shall be as shown in Table 7B-1 and Appendix C of this Manual.

The Conventional Road sign size shall be used on public roads, streets, and highways unless engineering judgment determines that a Minimum or Oversized sign size would be more appropriate.

The Minimum sign size shall be used only where traffic volumes are low and speeds are 30 mph or lower, as determined by engineering judgment.

The Oversized sign size shall be used on expressways.

GUIDANCE:

The Oversized sign sizes should be used on roadways that have four or more lanes with posted speed limits of 40 mph or higher.

OPTION:

The sizes in the Oversized column may also be used at other locations that require increased emphasis, improved recognition, or increased legibility.

Signs and plaques larger than those shown in Table 7B-1 and Appendix C of this Manual may be used (see Section 2A.11).

7B.2 Illumination and Reflectorization

STANDARD:

The signs used for school area traffic control shall be retroreflectorized or illuminated.

7B.3 Position of Signs

SUPPORT:

Sections 2A.16 and 2A.17 contain provisions regarding the placements and locations of signs.

Section 2A.19 contains provisions regarding the lateral offsets of signs.

OPTION:

In-roadway signs for school traffic control areas may be used consistent with the requirements of Sections 2B.12, 7B.11, and 7B.12.

7B.4 Height of Signs

SUPPORT:

Section 2A.18 contains provisions regarding the mounting height of signs.

7B.5 Installation of Signs

SUPPORT:

Section 2A.16 contains provisions regarding the installation of signs.

7B.6 Lettering

SUPPORT:

The Federal Highway Administration's "Standard Highway Signs and Markings" book contains information regarding sign lettering.

7B.7 Sign Color for School Warning Signs

STANDARD:

School warning signs, including the "SCHOOL" portion of the School Speed Limit (S5-1) sign and including any supplemental plaques used in association with these warning signs, shall have a fluorescent yellow-green background with a black legend and border unless otherwise provided in this Manual for a specific sign.

When the fluorescent yellow-green background color is used, a systematic approach featuring one background color within a zone or area shall be used. The mixing of standard yellow and fluorescent yellow-green backgrounds within a zone or area is not allowed.

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Sign	Sign Designation	Section	Conventional Road	Minimum	Oversized
School	S1-1	7B.8	36 x 36	30 x 30	48 x 48
School Bus Stop Ahead	S3-1	7B.13	36 x 36	30 x 30	48 x 48
School Bus Stop Ahead	S3-2	7B.14	36 x 36	30 x 30	48 x 48
Reduced School Speed Limit Ahead	S4-5, S4-5a	7B.16	36 x 36	30 x 30	48 x 48
School Speed Limit XX When Flashing	S5-1	7B.15	24 x 48	---	36 x 72
End School Zone	S5-2	7B.9	24 x 30	---	36 x 48
End School Speed Limit	S5-3	7B.15	24 x 30	---	36 x 48
In-Street Ped Crossing	R1-6a, R1-6c	7B.11, 7B.12	12 x 36	---	---
Speed Limit (School Use)	R2-1	7B.15	24 x 30	---	36 x 48
Begin Higher Fines Zone	R2-10	7B.10	24 x 30	---	36 x 48
End Higher Fines Zone	R2-11	7B.10	24 x 30	---	36 x 48

Plaque	Sign Designation	Section	Conventional Road	Minimum	Oversized
XXX to XXX AM	S4-1P	7B.15	24 x 10	---	36 x 18
XXX to XXX PM	S4-2P			---	36 x 18
When Children Are Present	S4-3P	7B.15	24 x 10	---	36 x 12
School	S4-4P	7B.9, 7B.15	24 x 8	---	36 x 18
When Flashing	S4-6P	7B.15	24 x 10	---	36 x 18
Mon-Fri	S4-7P	7B.15	24 x 10	---	36 x 18
All Year	S4-8P	7B.9	24 x 12	---	30 x 18
Fines Higher	R-2-6P	7B.10	24 x 18	---	36 x 24
XX Feet	W16-2P	7B.8	24 x 18	---	30 x 24
XX FT	W16-2aP	7B.8	24 x 12	---	30 x 18
Turn Arrow	W16-5P	7B.8, 7B.9, 7B.11	24 x 12	---	30 x 18
Advance Turn Arrow	W16-6P	7B.8, 7B.9, 7B.11	24 x 12	---	30 x 18
Diagonal Arrow	W16-7P	7B.12	24 x 12	---	30 x 18
Diagonal Arrow (optional size)	W16-7P	7B.12	21 x 15	---	---
Ahead	W16-9P	7B.11	24 x 12	---	30 x 18

- Notes: 1. Larger signs may be used when appropriate.
2. Dimensions are shown in inches and are shown as width x height.
3. Minimum sizes for multi-lane conventional roads shall be as shown in the Conventional Roads column that face shared-use paths and pedestrian facilities.

Table 7B-1. School Area Sign and Plaque Sizes

7B.10 Higher Fines Zone Signs (R2-10, R2-11) and Plaques



GUIDANCE:

Where increased fines are imposed for traffic violations within a designated school zone, a BEGIN HIGHER FINES ZONE (R2-10) sign or a FINES HIGHER (R2-6P), FINES DOUBLE (R2-6aP), or \$XX FINE (R2-6bP) plaque (see Figure 2B-3) should be installed as a supplement to the School Zone (S1-1) sign to identify the beginning point of the higher fines zone (see Figures 7B-2 and 7B-3).

OPTION:

Where appropriate, one of the following plaques may be mounted below the sign that identifies the beginning point of the higher fines zone:

- A. An S4-1P plaque (see Section 7B-15) specifying the times that the higher fines are in effect,
- B. A WHEN CHILDREN ARE PRESENT (S4-2P) plaque (see Section 7B-15), or
- C. A WHEN FLASHING (S4-4P) plaque (see Section 7B-15) if used in conjunction with a yellow flashing beacon.

STANDARD:

Where a BEGIN HIGHER FINES ZONE (R2-10) sign or a FINES HIGHER (R2-6P) plaque supplementing a School Zone (S1-1) sign is posted to notify road users of increased fines for traffic violations, an END HIGHER FINES ZONE (R2-11) sign or an END SCHOOL ZONE (S5-2) sign shall be installed at the downstream end of the zone to notify road users of the termination of the increased fines zone (see Figures 7B-2 and 7B-3).

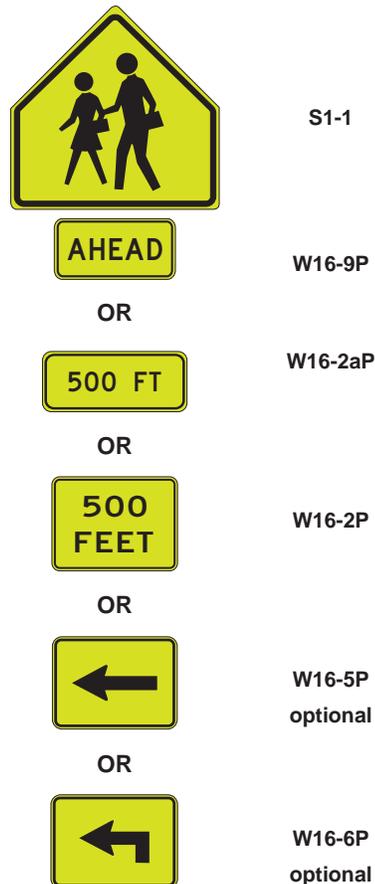
SUPPORT:

The FINES HIGHER plaque may be used when both the beginning and the ending of a school speed zone are signed.

Minnesota Statute 169.14, subd. 5a (d) states:

“ ... a person who violates a speed limit established under this subdivision is assessed an additional surcharge equal to the amount of the fine imposed for the violation, but not less than \$25.”

7B.11 School Advance Crossing Assembly



STANDARD:

The School Advance Crossing assembly shall consist of a School (S1-1) sign supplemented with an AHEAD (W16-9P) plaque or an XX FEET (W16-2P or W16-2aP) plaque.

Except as provided in paragraph one of the following Option, a School Advance Crossing assembly shall be used in advance (see Table 2C-4 for advance placement guidelines) of the first School Crossing assembly (see Section 7B.12) that is encountered in each direction as traffic approaches a school crosswalk (see Figure 7B-4).

OPTION:

The School Advance Crossing assembly may be omitted (see Figure 7B-5) where a School Zone (S1-1) sign (see Section 7B.9) is installed to identify the beginning of a school zone in advance of the School Crossing assembly.

If a school crosswalk is located on a cross street in close proximity to an intersection, a School Advance Crossing assembly with a supplemental arrow (W16-5P or W16-6P) plaque may be installed on each approach of the street or highway to warn road users making a turn onto the cross street that they will encounter a school crosswalk soon after making the turn.

7B.12 School Crossing Assembly

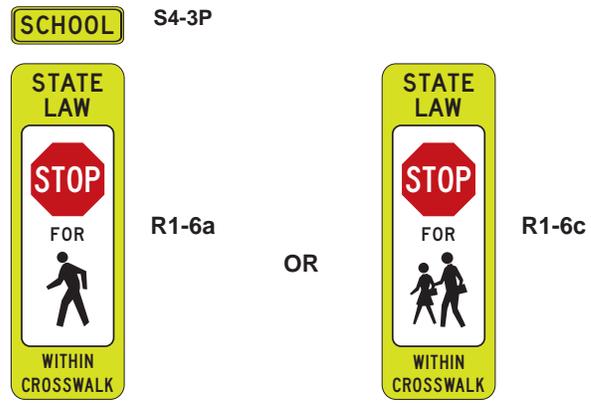


STANDARD:

If used, the School Crossing assembly (see Figure 7B-1) shall be installed at the school crossing (see Figures 7B-4 and 7B-5), or as close to it as possible, and shall consist of a School (S1-1) sign supplemented with a diagonal downward pointing arrow (W16-7P) plaque to show the location of the crossing.

The School Crossing assembly shall not be used at crossings other than those adjacent to schools and those on established school pedestrian routes.

The School Crossing assembly shall not be installed on approaches controlled by a STOP or YIELD sign or a traffic signal.



OPTION:

The In-Street Pedestrian Crossing (R1-6a or R6-c) sign (see Section 2B.12) or the In-Street Schoolchildren Crossing (R1-6b or R1-6c) sign may be used at unsignalized school crossings. If used at a school crossing, a 12 x 4-inch SCHOOL (S4-3P) plaque may be mounted above the sign. The STATE LAW legend on the R1-6 series signs may be omitted.

The Overhead Pedestrian Crossing (R1-9 or R1-9a) sign (see Section 2B.12) may be modified to replace the standard pedestrian symbol with the standard schoolchildren symbol and may be used at unsignalized school crossings. The STATE LAW legend on the R1-9 series signs may be omitted.

STANDARD:

If an In-Street Pedestrian Crossing sign or an In-Street Schoolchildren Crossing sign is placed in the roadway, the sign support shall comply with the mounting height and breakaway special mounting support requirements for In-Street Pedestrian Crossing (R1-6 or R1-6a) signs (see Section 2B.12).

The In-Street Pedestrian Crossing sign, the In-Street Schoolchildren Crossing sign, and the Overhead Pedestrian Crossing sign shall not be used at signalized locations.

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7B.13 School Bus Stop Ahead Sign (S3-1)



S3-1

STANDARD:

The School Bus Stop Ahead (S3-1) sign shall be installed in advance of locations where a school bus, when stopped to pick up or discharge passengers, is not visible for an adequate distance and where there is no opportunity to relocate the school bus stop to provide adequate sight distance. See Table 2C-4 for adequate sight distances.

7B.13.1 SCHOOL BUS LOADING AREA

Sign (S3-X1)



S3-X1

STANDARD:

The School Bus Loading Area sign shall be used to clearly identify an area to both motorists and bus drivers. It shall be used when there is sufficient turnout width or turnout space available to accommodate such a loading area, and the local school authorities have requested the loading area. This loading area shall not be located within a designated and marked left or right turn lane nor in such a position as obstruct the view of other motorists or to create a hazard on the roadway. The sign shall be installed at the beginning of the loading area.

The following are criteria for the establishment of a school bus loading area:

1. Roadway shoulders must be wide enough to accommodate the full width of the bus.
2. There must be sufficient space beside the bus for passengers to stand safely during loading and unloading.

3. No loading area shall be established adjacent to an obstruction such as guardrail, culvert, mailboxes, etc.
4. No loading area shall be permitted in a designated and marked turn lane.
5. No loading area shall be located such that passengers are required to cross the roadway on the way to or from the bus.
6. The local school districts shall keep the appropriate road authority informed about plans to add or delete loading areas.

SUPPORT:

Refer to Minnesota Statute 169.443 and 169.444 for requirements associated with the use of this sign.

7B.14 SCHOOL BUS TURN AROUND Sign (S3-2a)

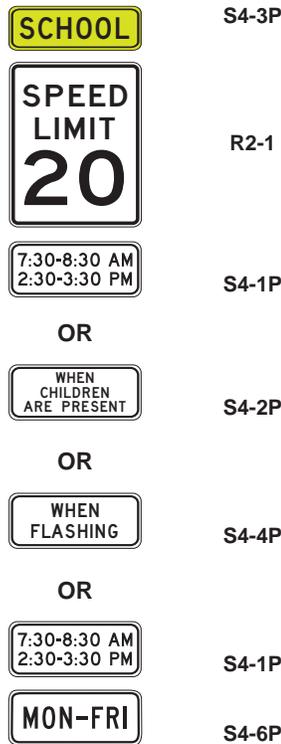


S3-2a

OPTION:

The SCHOOL BUS TURN AROUND (S3-2a) sign may be installed in advance of locations where a school bus turns around on a roadway at a location not visible to approaching road users for a distance as determined by the "0" column under Condition B of Table 2C-4, and where there is no opportunity to relocate the school bus turn around to provide the distance provided in Table 2C-4.

7B.15 School Speed Limit Assembly (S4-1, S4-2, S4-3, S4-4, S4-6, S5-1) and END SCHOOL SPEED LIMIT Sign (S5-3)



STANDARD:

A School Speed Limit assembly or a School Speed Limit (S5-1) sign shall be used to indicate the speed limit where a reduced school speed limit zone has been established based upon an engineering study or where a reduced school speed limit is specified for such areas by statute. The School Speed Limit assembly or School Speed Limit sign shall be placed at or as near as practical to the point where the reduced school speed limit zone begins (see Figures 7B-3 and 7B-5). It shall be used in conjunction with the School Advance Warning sign (see Section 7B.8).

If a reduced school speed limit zone has been established, a School (S1-1) sign shall be installed in advance (see Table 2C-4 for advance placement guidelines) of the first School Speed Limit sign assembly or S5-1 sign that is encountered in each direction as traffic approaches the reduced school speed limit zone (see Figures 7B-3 and 7B-5).

GUIDANCE:

Where increased fines are imposed for traffic violations within a reduced school speed limit zone, a FINES HIGHER (R2-6P), FINES DOUBLE (R2-6aP), or \$XX FINE (R2-6bP) plaque (see Figure 2B-3) should be installed as a supplement to the reduced school speed limit sign to notify road users.

STANDARD:

Except as provided in paragraph one of the following Option, the downstream end of an authorized and posted reduced school speed limit zone shall be identified with an END SCHOOL SPEED LIMIT (S5-3) sign (see Figure 7B-5).

OPTION:

If a reduced school speed limit zone ends at the same point as a higher fines zone, an END SCHOOL ZONE (S5-2) sign may be used instead of a combination of an END HIGHER FINES ZONE (R2-11) sign and an END SCHOOL SPEED LIMIT (S5-3) sign.

A standard Speed Limit sign showing the speed limit for the section of highway that is downstream from the authorized and posted reduced school speed limit zone may be mounted on the same post above the END SCHOOL SPEED LIMIT (S5-3) sign or the END SCHOOL ZONE (S5-2) sign.

GUIDANCE:

The beginning point of a reduced school speed limit zone should be at least 200 feet in advance of a school crossing, or other school related activities; however, this 200-foot distance should be increased if the reduced school speed limit is 30 mph or higher.

STANDARD:

The School Speed Limit Assembly shall be either a fixed-message sign assembly or a changeable message sign.

The fixed-message School Speed Limit assembly shall consist of a top plaque (S4-3P) with the legend SCHOOL, a Speed Limit (R2-1) sign, and a bottom plaque (S4-1P, S4-2P, S4-4P, or S4-6P) indicating the specific periods of the day and/or days of the week that the special school speed limit is in effect.

OPTION:

Changeable message signs (see Chapter 2L and Section 6F.60) may be used to inform drivers of the school speed limit. If the sign is internally illuminated, it may have a white legend on a black background. Changeable message signs with flashing beacons may be used for situations, where greater emphasis of the special school speed limit is needed.

GUIDANCE:

Even though it might not always be practical because of special features to make changeable message signs conform in all respects to the standards in this Manual for fixed-message signs, during the periods that the school speed limit is in effect, their basic shape, message, legend layout, and colors should comply with the standards for fixed-message signs.

A confirmation light or device to indicate that the speed limit message is in operation should be considered for inclusion on the back of the changeable message sign.

If supplemental plaques S4-1P or S4-2P are used to indicate the periods during which the school speed limit is in effect, considerations should be given to increasing the sign sizes to provide improved legibility. Section 2A.13, Table 7B-1, and Appendix C provides guidance regarding larger signs.

STANDARD:

Fluorescent yellow-green pixels shall be used when the "SCHOOL" message is displayed on a changeable message sign for a school speed limit.

OPTION:

Changeable message signs may use blank-out messages or other methods in order to display the school speed limit only during the periods it applies.

A Speed Limit Sign Beacon (see Section 4L.4) also may be used, with a WHEN FLASHING legend, to identify the periods that the school speed limit is in effect.

SUPPORT:

Under the provisions of Minnesota Statutes, Section 169.14, Subd. 5a, the Minnesota Department of Transportation has developed the publication "A Guide to Establishing Speed Limits in School Zones" describing the procedures for establishing school speed limits in Minnesota (see Chapter 7E).

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7B.16 Reduced School Speed Limit Ahead Sign (S4-5, S4-5a)



S4-5



S4-5a

GUIDANCE:

A Reduced School Speed Limit Ahead (S4-5, S4-5a) sign should be used to inform road users of a reduced speed zone where the speed limit is being reduced by more than 10 mph, or where engineering judgment indicates

STANDARD:

If used, the Reduced School Speed Limit Ahead sign shall be followed by a School Speed Limit sign or a School Speed Limit assembly.

The speed limit displayed on the Reduced School Speed Limit Ahead sign shall be identical to the speed limit displayed on the subsequent School Speed Limit sign or School Speed Limit assembly.

7B.17 Parking and Stopping Signs (R7 and R8 Series)

OPTION:

Parking and stopping regulatory signs may be used to prevent parked or waiting vehicles from blocking pedestrians' views, and drivers' views of pedestrians, and to control vehicles as a part of the school traffic plan.

SUPPORT:

Parking signs and other signs governing the stopping and standing of vehicles in school areas cover a wide variety of regulations. Typical examples of regulations are as follows:

- A. No Parking 8:00 AM to 5:00 PM School Days Only;
- B. No Stopping 8:00 AM to 5:00 PM School Days Only;
- C. 5 Min Loading 8:00 AM to 5:00 PM School Days Only; and
- D. No Standing 8:00 AM to 5:00 PM School Days Only.

Sections 2B.46, 2B.47, and 2B.48 contain information regarding the signing of parking regulations in school zone areas.

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Part 7. TRAFFIC CONTROLS FOR SCHOOL AREAS

7C. Markings

7C.1 Functions and Limitations

SUPPORT:

Markings have definite and important functions in a proper scheme of school area traffic control. In some cases, they are used to supplement the regulations or warnings provided by other devices, such as traffic signs or signals. In other instances, they are used alone and produce results that cannot be obtained by the use of any other device. In such cases they serve as a very effective means of conveying certain regulations, guidance, and warnings that could not otherwise be made clearly understandable.

Pavement markings have some potential limitations. They might be obscured by snow, might not be clearly visible when wet, and might not be durable when subjected to heavy traffic. In spite of these potential limitations, they have the advantage, under favorable conditions, of conveying warnings or information to the road user without diverting attention from the road.

7C.2 Crosswalk Lines

GUIDANCE:

Crosswalks should be marked at all intersections on established routes to a school where there is substantial conflict between motorists, bicyclists, and student movements; where students are encouraged to cross between intersections; or where students would not otherwise recognize the proper place to cross; or where motorists or bicyclists might not expect students to cross (see Figure 7A-1).

Crosswalk lines should not be used indiscriminately. An engineering study considering the factors described in Section 3B.18 should be performed before a marked crosswalk is installed at a location away from a traffic control signal or an approach controlled by a STOP or YIELD sign.

The engineering study should consider the number of lanes, the presence of a median, the distance from adjacent signalized intersections, the pedestrian volumes and delays, the average daily traffic (ADT), the posted or statutory speed limit or 85th percentile speed, the geometry of the location, the possible consolidation of multiple crossing points, the availability of street lighting, and other appropriate factors.

Because non-intersection school crossings are generally unexpected by the road user, warning signs (see Sections 7B.11 and 7B.12) should be installed for all marked school crosswalks at non-intersection locations.

Adequate visibility of students by approaching motorists and of approaching motorists by students should be provided by parking prohibitions or other appropriate measures.

SUPPORT:

Section 3B.18 contains provisions regarding the placement and design of crosswalks, and Section 3B.16 contains provisions regarding the placement and design of the stop lines and yield lines that are associated with them. Provisions regarding the curb markings that can be used to establish parking regulations on the approaches to crosswalks are contained in Section 3B.23.

7C.3 Pavement Word, Symbol, and Arrow Markings

OPTION:

If used, the SCHOOL word marking may extend to the width of two approach lanes (see Figure 7C-1).

GUIDANCE:

If the two-lane SCHOOL word marking is used, the letters should be 10 feet or more in height.

SUPPORT:

Section 3B.20 contains provisions regarding other word, symbol, and arrow pavement markings that can be used to guide, warn, or regulate traffic.

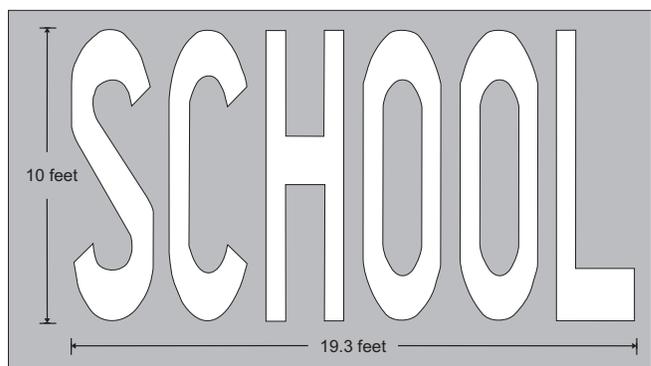


Figure 7C-1. Two-Lane Pavement Marking of "SCHOOL"

Part 7. TRAFFIC CONTROLS FOR SCHOOL AREAS

7D. Crossing Supervision

7D.1 Types of Crossing Supervision

SUPPORT:

There are three types of school crossing supervision:

- A. Adult control of pedestrians and vehicles by adult crossing guards
- B. Adult control of pedestrians and vehicles by uniformed law enforcement officers, and
- C. Student and/or parent control of only pedestrians with student and/or parent patrols.

Information regarding the organization, administration and operation of a school safety patrol program is contained in “AAA School Safety Patrol Operations Manual” (see Section 1A.11).

7D.2 Adult Crossing Guards

OPTION:

Adult crossing guards may be used to provide gaps in traffic at school crossings where an engineering study has shown that adequate gaps must be created (See Section 7A-3) and where authorized by law.

7D.3 Choice of Adult Guards

SUPPORT:

High standards for selection of adult crossing guards are essential because they are responsible for the safety of and the efficient crossing of the street by schoolchildren within and in the immediate vicinity of school crosswalks.

GUIDANCE:

Adult crossing guards should possess the following minimum qualifications:

- A. Average intelligence;
- B. Good physical condition, including sight, and hearing;
- C. Ability to control a STOP paddle effectively to provide approaching road users with a clear, fully direct view of the paddle's STOP message during the entire crossing movement;
- D. Ability to communicate specific instructions clearly, firmly, and courteously;
- E. Ability to recognize potentially dangerous traffic situations and warn and manage students in sufficient time to avoid injury.
- F. Mental alertness;
- G. Neat appearance;
- H. Good character;

I. Dependability; and

J. An overall sense of responsibility for the safety of students.

K. Completion of an official training program.

7D.4 Uniform of Adult Crossing Guards

STANDARD:

Law enforcement officers performing school crossing supervision and adult crossing guards shall wear high-visibility retroreflective safety apparel labeled as ANSI 107-2004 standard performance for Class 2 as described in Section 6E.2.

Compliance Date: December 31, 2011

7D.5 Operating Procedures for Adult Crossing Guards

STANDARD:

Adult crossing guards shall not direct traffic in the usual law enforcement regulatory sense. In the control of traffic, they shall pick opportune times to create a sufficient gap in the traffic flow. At these times, they shall stand in the roadway to indicate that pedestrians are about to use or are using the crosswalk, and that all vehicular traffic must stop.

Adult crossing guards shall use a STOP paddle. The STOP paddle shall be the primary hand-signaling device and shall be used as shown in Section 6K (the Field Manual) of this Manual.

The STOP (R1-1) paddle shall be an octagonal shape. The background of the STOP face shall be red with at least 6-inch series upper-case white letters and border. The paddle shall be at least 18 inches in size and have the word message STOP on both sides. The paddle shall be retroreflectorized or illuminated when used during hours of darkness.

OPTION:

The STOP paddle may be modified to improve conspicuity by incorporating white or red flashing lights on both sides of the paddle. Among the types of flashing lights that may be used are individual LEDs or groups of LEDs.

The white or red flashing lights or LEDs may be arranged in any of the following patterns:

- A. Two white or red lights centered vertically above and below the STOP legend,
- B. Two white or red lights centered horizontally on each side of the STOP legend,
- C. One white or red light centered below the STOP legend,
- D. A series of eight or more small white or red lights having a diameter of 1/4 inch or less along the outer edge of the paddle, arranged in an octagonal pattern at the eight corners of the STOP paddle (more than eight lights may be used only if the arrangement of the lights is such that it clearly conveys the octagonal shape of the STOP paddle), or
- E. A series of white lights forming the shapes of the letters in the legend.

STANDARD:

If flashing lights are used on the STOP paddle, the flash rate shall be at least 50, but no more than 60, flash periods per minute.

Part 7. TRAFFIC CONTROLS FOR SCHOOL AREAS

7E. Speed Limits in School Zones

7E.1 Establishing Speed Limits in School Zones

STANDARD:

When school speed limits are being established, they shall follow the guidelines set forth starting on the following pages.

A Guide to Establishing Speed Limits in School Zones



Prepared by the Office of Traffic, Safety, and Technology
Minnesota Department of Transportation
2012

<http://www.dot.state.mn.us/>

A Guide to Establishing Speed Limits in School Zones

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PREFACE

The purpose of this document is to assist in conducting the traffic investigation, identifying hazards and eliminating or reducing them.

THIS INVESTIGATION IS REQUIRED FOR THE ESTABLISHMENT OF A LEGAL SCHOOL SPEED ZONE ACCORDING TO MINNESOTA STATUTES, SECTION 169.14, SUBDIVISION 5a.

The school zone investigation set forth in this document constitutes the prescribed engineering and traffic investigation. As discussed above, this is a coordinated effort requiring several disciplines to accurately perform some of the duties described within this document.

INTRODUCTION

Ensuring the safety of students on public streets and highways is the responsibility of parents, law enforcement, school and government officials. Parents must provide day to day education and supervision in order to develop safe behavior by their children. Roadway engineers must provide a safe environment that minimizes vehicular-pedestrian crash probability. Enforcement officials must provide regular patrols to discourage unlawful behavior and provide training for crossing guards. School district personnel must communicate and coordinate safety programs (such as school patrols or safety education) with children and their parents. Typically the road authority provides the oversight in performing the traffic investigation described in these guidelines.

The responsibility to achieve pedestrian safety must be faced with the knowledge that, despite our best efforts, children and drivers will make mistakes bearing tragic consequences. When this occurs, conflicts between parents and officials may follow concerning the appropriate course of action to avoid recurrence of a similar tragedy.

In order to provide a safe environment for children, a traffic investigation should be conducted along school routes and in school zones. The desired results of such an investigation are effective pedestrian and traffic controls, and the creation of a sound school route plan.

SPEED LIMIT LEGISLATION

In 1975, the Legislature changed Minnesota Statutes by adding Subd. 5a to Section 169.14. This change enables local authorities to establish speed limits in school zones, an authority previously granted in 1937 solely to the Commissioner of Highways. Revisions to the legislation have been made through the years. This law gives additional responsibility and control of school zone safety to local authorities on those streets within their jurisdiction. In exercising this prerogative, it is important that local authorities not permit pressures and emotions to outweigh reason and judgment, since improper speed zones can actually decrease safety.

THE LAW

Definitions for some of the terms used within the law are on the next page.

Minnesota Statutes, Section 169.14, reads in part:

Subd. 5a. Speed zoning in school zone; surcharge.

- (a) Local authorities may establish a school speed limit within a school zone of a public or non-public school upon the basis of an engineering and traffic investigation as prescribed by the commissioner of transportation. The establishment of a school speed limit on any trunk highway shall be with the consent of the commissioner of transportation. Such school speed limits shall be in effect when children are present, going to or leaving school during opening or closing hours or during school recess periods. The school speed limit shall not be lower than 15 miles per hour and shall not be more than 30 miles per hour below the established speed limit on an affected street or highway.
- (b) The school speed limit shall be effective upon the erection of appropriate signs designating the speed and indicating the beginning and end of the reduced speed zone. Any speed in excess of such posted school speed limit is unlawful. All such signs shall be erected by the local authorities on those streets and highways under their respective jurisdictions and by the commissioner of transportation on trunk highways.
- (c) For the purpose of this subdivision, "school zone" means that section of a street or highway which abuts the grounds of a school where children have access to the street or highway from the school property or where an established school crossing is located provided the school advance sign prescribed by the manual on uniform traffic control devices adopted by the commissioner of transportation pursuant to section 169.06 is in place. All signs erected by local authorities to designate speed limits in school zones shall conform to the Manual on Uniform Traffic Control Devices.
- (d) Notwithstanding section 609.0331 or 609.101 or other law to the contrary, a person who violates a speed limit established under this subdivision is assessed an additional surcharge equal to the amount of the fine imposed for the violation, but not less than \$25.

DEFINITIONS

"... **local authorities** ..." as defined in Section 169.011 Subd 38 means *"every county, municipal and other local board or body having authority to adopt local police regulations under the constitution and laws of this state, ..."* School zone speed limits must be established by the appropriate city council or county board action, and cannot be established by school boards.

"... **upon the basis of an engineering and traffic investigation** ..." This document presents guidance on the preparation of the necessary engineering and traffic investigation.

"... **as prescribed by the commissioner of transportation** ..." is meant to ensure that motorists will encounter speed zones determined by valid methods applied uniformly statewide.

"... **the establishment of a school speed limit on any trunk highway shall be with the consent of the commissioner of transportation** ..." The commissioner retains authority on trunk highways that may be located in a school zone. If a school zone speed limit is desired on a trunk highway, the appropriate Minnesota Department of Transportation District Office should be contacted to coordinate the traffic investigation and provide guidance. If the school speed limit is on a local road but a trunk highway is part of a school route plan, the District Office will provide pertinent data to the local road authority as requested, in order for the local road authority to complete their investigation.

"... **Such school speed limits shall be in effect when children are present, going to or leaving school during opening or closing hours during school recess periods** ..." Because the reduced speed may only be necessary during these times, it is unreasonable to require drivers to reduce speeds during other times. The school zone limit is "part-time" and must be identified accordingly. Non-school time speed limits must be determined in accordance with Minnesota Statutes 169.14.

"... **the school speed limit shall not be lower than 15 MPH and shall not be more than 30 MPH below the established speed limit on the affected street or highway** ..." Limitations on the speed zone reductions are meant to preclude creation of hazardous conditions.

"...**school zone**..." This is defined in MN statute 169.14 subd 5a and means the same in this document including any maximum distances defined in the Minnesota Manual on Uniform Traffic Control Devices¹ (MN MUTCD).

SCHOOL CHILD CRASH EXPERIENCE

Crashes on public roads cause billions of dollars in economic losses, sometimes tragic consequences for those injured and grief caused by fatal crashes. Statewide data summarized for three years (2005-2007) from MN Department of Public Safety Crash Facts², showed that there was a total 248,063 crashes of which 5739 involved pedestrians and bicyclists. 21 children, ages 5-19, died and 2817 were injured in vehicle/pedestrian crashes. The same 3 year records for that age group revealed that 7 children died and 2839 were injured in vehicle/bicycle crashes. For 10 years from 1998 to 2007 the range of pedestrian fatalities (all ages annually) has a wide fluctuation from a low of 33 to a high of 56. Social and economic factors fluctuate, which impacts the number and exposure of pedestrians but what doesn't change is the vulnerability of this group. For 2007, nearly 4% of pedestrian crashes resulted in a death, compared to about one-half of 1% for all traffic crashes. Identification of the locations, the hazards, and nature of the child related crashes is necessary in dealing with the prevention of these traumatic crashes.

WHERE AND WHEN CRASHES OCCUR

MN crash data was filtered using Geographic Information System (GIS) technology, for crashes that involved school age pedestrians, occurred on a weekday, during school year times, and occurred on MN trunk highways from 1998 to 2000. There were 89 plotted crashes meeting this criteria. Of the 89, only 10 crashes occurred within 1,000 feet of a school. The data indicates that many crashes are happening on the streets that may be leading to school but fewer crashes close to the school.

Although crash data is subject to variability, such as busing or walking distance, it is apparent that a program designed to improve safety for the total school trip should emphasize factors that will also carry over to all streets used by the children.

WHO AND WHY CRASHES OCCUR

Further insights can be gathered from an analysis of circumstances contributing to school child/vehicle crashes. A review of comments made by witnesses and officers investigating the Minnesota crashes found that:

- many crashes occurred when the child dashed from behind or between parked cars.
- many occurred even though the vehicle was moving very slowly because of traffic delays, control devices or obstructed views.

Previous reports³ involved the determination of who was involved and found that:

- the typical pedestrian involved in a crash was young (K- 3rd grade) and had considerable difficulty understanding and properly using traffic control devices.
- the typical driver in the school area is a local resident driving to (or from) work. Further, "the driver has a child between the ages of five and nine and is aware of the school area - not because of signing, but because of familiarity with the area. "

SPEED LIMIT INFLUENCE

Often, people's first answer to hazard reduction is to reduce the speed limit. However, lower speed zones are not the only solution to hazard reduction. It may not be an answer at all. Numerous studies show that the passive posting of a speed limit sign does not reduce the actual operating speed of drivers and can actually increase the risk of crashes.

The increase in crash risk stems from a mismatch between the posted speed limit and the operating speed. The speed limit sign has a legal value on it but most drivers are basing their travel speed on lane width, traffic volume, environment, etc. and reflects the driver's choice of what is safe and reasonable. Some motorists may travel at the posted value while others are choosing a different operating speed and this creates a large variation in travel speeds. The variation in these travel speeds makes it difficult for pedestrians to accurately gauge safe crossings. The pedestrian may perceive a safe crossing time based on the speed of one vehicle and not anticipate the higher speed of another approaching vehicle causing a misjudgment on the safe time to cross. Similar misjudgments happen to vehicle drivers trying to cross or enter the road. The larger the range of vehicle speeds, the more likely this will occur. When posted speed limits correspond more closely to operating speeds, the consistent vehicle travel speeds permit better judgment calls thereby improving the safety.

A 1990 Transportation Research Board (TRB) Record⁴ summarized that *"on streets with normal speed limits of 35 mph, the 85th percentile speeds in zones with 25-mph school speed limits were lower than those in zones with 15- or 20-mph limits. Therefore, it was concluded that school speed limits lower than 25 mph should probably not be used on these streets."* Minnesota has studied speed trends after changing posted speed limits and discovered similar results, that passive signing by itself does not achieve the desired speed reduction.

The legislation granting authority to establish school zone speed limits to local officials is not intended as an endorsement of blanket zoning or maximum reductions. Rather, many techniques should be considered. Other solutions include, but are not limited to: sidewalk construction, parking restrictions, crossing guard utilization, stop sign or signal placement and pedestrian re-routing. These measures are almost always more effective in reducing a pedestrian hazard. Effective safety results from the careful consideration of all possible solutions to a hazard. The school zone hazard inventory and the school route plan are of great value in determining appropriate actions in particular situations.

THE TRAFFIC AND ENGINEERING INVESTIGATION

The engineering and traffic investigation consists of:

- 1) Preparing a school route plan. See Figure 1
- 2) Conducting a school zone hazard evaluation
- 3) All hazards should be placed in a tabular listing with a recommended corrective action.

See Figure 2.

SCHOOL ROUTE PLAN

The school route plan is most effective for schools serving kindergarten, elementary and middle school students. High school students generally have better skills in judging traffic hazards but a school route plan is still useful by encouraging those students to use protected crossings. The plan, developed jointly by the school, enforcement and traffic officials responsible for school pedestrian safety, consists of a map showing streets, the school, existing traffic controls, established school routes and established school crossings. An additional benefit of having a plan, is that it can be used to identify areas that may qualify for special grant money that is sometimes available for safety improvements.

The plan permits the orderly review of school area traffic control needs, and the coordination of school pedestrian safety education and engineering activities. The preparation of such a plan is vital to the effective analysis of a school zone, and is necessary in determining an appropriate solution to a hazardous school zone situation. The school route plan is the primary tool in this effort. Engineering officials can use the plan to prioritize maintenance of painting crosswalks, prioritize infrastructure improvements such as sidewalks, or prioritize sign replacement programs. Families can use the plan to ensure their children are using a safe route and can escort children to provide additional safety. School officials can use the plan to schedule locations for crossing guards. Police can use the plan to schedule locations at critical crosswalks where additional enforcement may be needed for pedestrian or traffic control.



The main objective in creating a school route plan is to minimize the number of streets crossed, maximize the safety of crossings and routes used by school children and utilize existing protected crossings. The number of crossings is minimized by concentrating students into larger groups as they approach the school. Students are directed along common routes which merge with other common routes until, near the school, all of the students are on very few routes.

The safety of the crossings is maximized by the effective use of vehicular and pedestrian controls. Often the simplest and most efficient way to reduce a pedestrian hazard is to utilize existing pedestrian facilities and vehicular traffic controls. The school route plan is the primary tool in this effort. Crossings can be chosen in such a way that existing stop signs, signals, crosswalks, and other traffic controls are used as much as possible. See Figure 1 for a sample school route plan taken from the MN MUTCD.¹

SCHOOL ZONE HAZARD EVALUATION

Since the preparation of a safe school route plan considers many factors, the hazards along alternative routes must be evaluated in light of what is present as well as what can be changed. The first step is to determine what hazards exist in the "informal" route established by the children. Next is a comparative evaluation of each route and all alternatives. Identified deficiencies or recommended improvements need to be documented and listed. A sample tabular listing is shown in Figure 2. Finally, the "formal" designation of the routes is made, with route changes being made to better utilize existing protections and with engineering changes being made to enhance the safety of the planned routes. The following information must be gathered and analyzed:

1) Roadway Information Needed

A basic feature of a hazard evaluation is an analysis of the roadway features which may cause or contribute to a hazardous situation.

The width of the road, the width of the shoulders and the number of traffic lanes should be determined and entered on a road log, see Figures 3 and 4 for examples. In the lower section of the road log, the roadway should be sketched and the dimensions clearly marked. When sketching the roadway, leave plenty of room to include fencing, sidewalks, bushes that restrict sight, etc. on your drawing.

Other roadway features which should be considered are the existence of curves, hills and nearby buildings which may cause a shortened sight distance. These features should also be recorded on the road log form.

What to do:

After reviewing the above characteristics, look at them critically to determine possible problems. Are the lanes narrow with no shoulders? Is the shoulder so narrow that children normally walking off the roadway are within a few feet of traffic? Is the street so wide that crossing the lanes of traffic will require a large time gap to cross?

If such problems exist they may be corrected by sidewalk construction, shoulder widening, median safety refuge or the rerouting of children away from that area. Other solutions may be discovered as each particular situation is analyzed.

Occasionally a sight distance restriction can be corrected by cutting back brush or leveling hills; but usually rerouting children to an area where they are seen better by motorists is a more effective method of correction. Any identified hazard should be put on the tabular listing form, with a recommended course of action.

2) Traffic Volumes Information Needed

Traffic volumes should be determined by manually counting vehicles during peak hours (tabulated by 5 or 15 minute periods) on an average school day, when children are going to and from school. Another acceptable but less accurate method would involve contacting the appropriate road authority and asking them for the traffic volumes on particular roads.

What to do:

Rerouting may be used to effectively increase vehicular control by directing children to intersections where control devices are already in place. This sort of solution works well and yet involves no substantial expense. A hazard due to children crossing high volume streets then may be corrected through the use of crossing guards or additional vehicular control. School routes should be crossing the lowest volume streets wherever possible. Any identified high volume roads that require the children to cross and need additional control should be put on the tabular listing form, with a recommended course of action.



3) Pedestrian Volumes Information Needed

Pedestrian volumes may be obtained either by counting pedestrians on an average school day, or by contacting school authorities who may have pedestrian volume information. Pedestrian volumes should be collected at critical intersections. The simplest method of counting pedestrians is to count them at a crossing, writing down the number in each group that crosses, along with the time of each crossing. The general age range of the pedestrians should also be recorded. Jaywalking or other unsafe behaviors should also be recorded since visible enforcement can encourage them to act more responsibly. If very wide roads need to be crossed, a more detailed pedestrian useable gap study⁵ may need to be conducted to determine an appropriate traffic control measure.

What to do:

High pedestrian volumes alone are not a problem. Research has shown that it is high traffic volumes that are more dangerous than high pedestrian volumes at crossings. It is safer, however, for a large pedestrian volume to be concentrated with an appropriate crossing treatment than to be spread out over an area. The primary method of concentrating pedestrians is the school route plan. Studies have shown that drivers respond favorably with increased care in driving when child pedestrians are visibly present; and if the school route plan is properly devised, children will be increasingly concentrated as they approach the school. Any identified high pedestrian volumes that are required to cross a road with no crossing treatment or crossing guards, should be put on the tabular listing form, with a recommended course of action.



4) Parking and Loading Zones Information Needed

Locations of parking and loading zones should be noted on the road log, map or sketch. Off street loading areas are desirable but even they should be evaluated by the transportation director for the school district. In loading and unloading zones, 2/3 of the fatal crashes are caused by the school bus striking the child. 6

What to do:

School bus loading zones and parking or stopping zones near entrances must be given careful attention. One of the greatest causes of child pedestrian crashes is children crossing between parked cars. Parking is a major sight distance limitation at crosswalks and intersections. In areas where children are not readily seen by motorists, no parking zones are an important feature of child safety. To improve both driver and pedestrian visibility, parking should be banned for at least 100 feet on the street where a hazardous situation has been noted. Where possible, loading zones should be off the street. Any identified sight restrictions caused by stopped cars or buses should be put on the tabular listing form with a recommended course of action.



5) Traffic Control Devices Information Needed

All traffic control devices such as school crossing signs, pavement markings, signals, school patrol locations, school zone warning signs, and speed limit signs should be precisely located on the road log for use in developing the school route plan. The condition and visibility of these control devices should be determined by driving through the area. A night time review should also be performed to determine the retroreflectivity of signs and condition of pavement markings. Minnesota winter nights are very long and may extend into the morning school start times or extracurricular activities after school. A night review is a good practice to evaluate if street lights would improve the visibility of major pedestrian crossings.



What to do:

Just as schools have rule books, traffic engineers have rules also. All traffic control devices must conform to the requirements of the current Minnesota Manual on Uniform Traffic Control Devices(MN MUTCD). A typical sign placement diagram from Chapter 7 for a school area is shown on Figure 5. Signs which are hidden by vegetation or poles should be made visible. Sign placement locations and minimum sign panel heights should be checked with the specifications listed in the MN MUTCD. Pavement markings and signs should be replaced if worn out. Once the route plan has been developed, locations needing new or additional controls will be apparent. Locations that have crossing guards should have signs and crosswalk pavement markings. Intersections can also have supplemental stop bars if stop signs or signals are present. Pedestrian walk signals should be checked for adequate crossing time based upon the pedestrian counts in Step 3 above and the crossing length. If any night time pedestrian crashes have occurred, additional lower level street lights (not the typical high mast mounted type) should be considered. Non compliant devices, signs or locations should be put on the tabular listing form, with a recommended course of action.

6) Sidewalk Information Needed

Like the previous items, sidewalks should be marked on the road log and on the school route plan. Width and condition of the sidewalk should also be noted.

What to do:

Drivers need a safe place to drive and children need a safe place to walk. The installation of sidewalks along streets creates this safe area and can reduce the crash possibility. Intermittent gaps or broken sections in the sidewalk pathway system cause children to enter the road at unexpected locations. Sometimes construction of relatively little sidewalk can greatly improve safety. Proper maintenance of sidewalks in the winter is also important. If this is not feasible it may be better to reroute students to a route with better pedestrian facilities. Thus, sidewalks play an important part in devising a school route plan. Identified missing sections of sidewalk, poor condition, or new path locations should be put on the tabular listing form, with a recommended course of action.



7) Fencing Information Needed

Fencing should be shown on the road log.

What to do:

Like sidewalk, relatively little fencing can drastically alter walking patterns. Used along school grounds it can effectively prevent children from crossing mid-block. It also prevents bouncing balls from entering the street, with children focused on pursuit of the ball instead of crossing the street safely. Therefore, adding fencing along selected school routes and school playgrounds can be an important part of pedestrian protection and control. Proposed fence locations should be put on the tabular listing form.



8) Crash History Information Needed

If the area studied includes high crash locations, they should be identified with an indication of types of crashes and crash rates, such as crashes per year and/or severity rates.

What to do:

High crash locations demand intensive study and positive action. The nature and time of the crashes should be considered to determine whether they are school related and whether these crashes are truly impacting the pedestrian safety. Crashes should be analyzed in light of the previously mentioned items in this investigation so that possible solutions such as sidewalk or fencing placement, traffic control device installations, etc. may be discovered to prevent reoccurring type crashes. If hazards cannot be eliminated by proper use of standard control devices, reroute children away from the area. If a pattern of crashes is discovered, a recommended course of action should be put on the tabular

listing form. While vehicle-to-vehicle type crashes don't directly impact pedestrian safety, if they are occurring at the school entrance they can be disrupting to traffic and pedestrians. The road authority should become involved for appropriate solutions.

9) Speed Zones Information needed

In place speed limit signs should be recorded on the area map or road log. If normal zones other than the typical 30 or 55 are in place, verification should be made that these were authorized by the Mn/DOT Commissioner and are legally established speed limits.

What to do:

Determination of appropriate school speed limits should be made after all of the inventory data have been analyzed and appropriate corrective measures have been taken. If possible, a speed check should be performed to check current operating speeds of motorists to determine the present compliance rates for the normal speed limit and verify if the normal speed limit is correct.

Stopping sight distance calculations should be made by a qualified engineering professional. American Association of State Highway and Transportation Officials (AASHTO) road design guidelines recommend using an object height of 2 feet and a driver eye height of 3.5 feet for calculating the stopping sight distance. If a sight restriction exists, and the stopping sight distance will be used as the determining factor in setting the school speed limit, a tighter specification may be appropriate. A small object such as a baseball should be placed on the centerline and distances calculated using the normal driver eye height of 3.5 feet. Speed values calculated by using this more restrictive object height, would justify a lower school speed limit thereby giving drivers improved reaction times for hazards such as children chasing a ball. For other cases, if all the hazards have been identified and corrected, and a lower speed limit is still necessary to improve sight distance or reaction times, then a slower school speed limit may be warranted.



Proper speed zoning can reduce vehicular speed differentials, provide basis for enforcement, increase driver respect for speed zoning, and decrease the crash potential. TRB research⁷ yielded some information about placement of the speed zone. The minimum speed in a school zone typically occurred between the initial 15 and 30 percent of the school zone length. Regardless of the length of the school zone or the school speed limit, drivers tended to achieve their minimum speed within the first 350 feet for low-speed sites and within 800 feet for higher-speed sites. The minimum speed in a speed zone always occurred in the first half of the school zone but was rarely maintained into the second half of the zone.

Even though law permits as much as a 30 MPH reduction in school zones, this data and similar research confirms that effective school zone speed limits should only be approximately 10 to 15 MPH below the normal value unless very unusual conditions are present. Also the zone should be equally spaced on either side of a marked crosswalk if there is one. The speed limit selected must be based on a common sense evaluation of the hazard potential and must be reasonable to gain voluntary driver acceptance. If larger reductions in speed are absolutely required, then a serious commitment from enforcement should be obtained to ensure compliance.

Improper speed zoning may increase crash potential by increasing the vehicular speed differentials, decreasing driver's respect for speed limits, misleading pedestrians as to true vehicular speed, leaving the actual speed virtually unchanged, making the majority of drivers 'speeders', and creating enforcement problems.

After these guidelines have been followed, the school speed limit signs can be erected by the local road authority on local roads or by the commissioner of transportation on trunk highways. Signs shall be erected in accordance with the MN MUTCD. A courtesy copy of the enabling resolution and backup data can be sent to the State Traffic Engineer at Mn/DOT if desired.

Summary

The hazard evaluation process enables you to determine which routes can be made the safest with the least cost and most assurance that they will be used. The school route plan should be reevaluated whenever changes in traffic or pedestrian patterns occur, when control devices change or when the route environment changes. If the physical hazards cannot be eliminated or minimized, alternatives such as busing, hired police control, intelligent transportation system or another innovative solution should be considered. Providing a safe environment for walking students is a key first step in establishing safety but it still requires educating the student pedestrians about safe and responsible actions and this is discussed later.

TRAFFIC CALMING METHODS

As indicated before, the erection of passive signs may not achieve the desired speed reductions. Recent technological and innovative design improvements have resulted in methods and devices that are more effective in increasing the driver's awareness, improving pedestrian safety, gaining compliance to reduced speed limits and providing proactive safety solutions. This collection of new tools is collectively called traffic calming and is functional in both residential settings and school areas.

One of the innovative designs is nicknamed a "bump out ". This design bumps out the curb section towards the centerline at the intersection, thus eliminating parking near the intersection. It narrows the road down to the normal thru lanes. This has some positive impacts to safety. It aids the driver in his sight lines of waiting pedestrians who desire to cross and it provides a shorter distance for the pedestrian to cross, thus reducing their exposure time on the street. It also gives the perception of a narrower road which causes the driver to slow down. Several different designs exist and it is important to coordinate with maintenance forces to develop a compatible bump out for the region.



Technology has produced changeable message signs which can change speed limit values based upon time of day or remote activation. These signs can display normal speed limits for the usual conditions and then display a new value for the planned event such as school release. This causes less confusion to the driver about what value he should be driving since only one value will be displayed at a time. Police are more confident about strict enforcement since there is no confusion.

Another new technology is radar activated speed message signs. As drivers approach these signs, a radar unit activates the display on the sign giving the driver his approach speed. This is immediate information about the driver's compliance to the desired speed limit. Several studies confirm that drivers slow down in an attempt to reach the posted speed as they pass the sign. As mentioned before, reasonable values must be used in the reduced zone or even these devices will not have the desired effect.



Other traffic calming techniques exist such as raised pedestrian crossings, speed tables (or benches), and median planters and each has its pros and cons. Bump outs and speed tables can have negative consequences for bicycle traffic so each road needs to be evaluated for its function. The Institute of Transportation Engineers (ITE) maintains a library of traffic calming solutions at <http://www.ite.org/traffic/>. Passive speed signs may not achieve the desired effect but combined with a traffic calming technique, speed reductions can improve. The road authority should analyze the appropriate treatment for its effectiveness on the proposed roadway.

SAFETY EDUCATION

Once the hazard inventory has been conducted and the route plan has been created, recommended changes in pedestrian and traffic control should be implemented. The implementation of the recommendations involves not only practical activity such as constructing sidewalks or installing signs, but also the educational activity of teaching students safety consciousness.

It was noted earlier in this report that children are rarely involved in crashes while crossing properly at an intersection. Rather, most child pedestrian crashes occur when the child is crossing mid-block or running from behind parked cars. Physical changes in the child's walking environment will provide a safe route but they need to be accompanied by an effective educational effort to prevent erratic or unsafe behavior by the child.

Children must be aware of the routes they should take to and from school, and a simplified school route plan (see Figure 1) should be sent home with each child. Crossing guards should inform transportation directors or school officials of children seen disregarding their route. All schools have a fire plan of which the students are carefully informed and allowed to practice, yet students are involved in crashes every year because their walking routes are ill-defined or poorly controlled. Certainly traffic safety deserves a good deal of educational time - time that will benefit the students not only when they going to or from school, but whenever they are near a roadway.



A good deal of general traffic safety should be taught, as well as information on proper routes. The internet contains curriculum guides, lesson plans, bike rodeo planning, walking school buses, school safety patrols and much more information on pedestrian safety. These are sponsored by national, state, local agencies and auto clubs such as AAA and are meant so that children, especially those in the earlier grades, are given the advantage of traffic safety knowledge. Such instruction is an integral part of a pedestrian hazard reduction program.

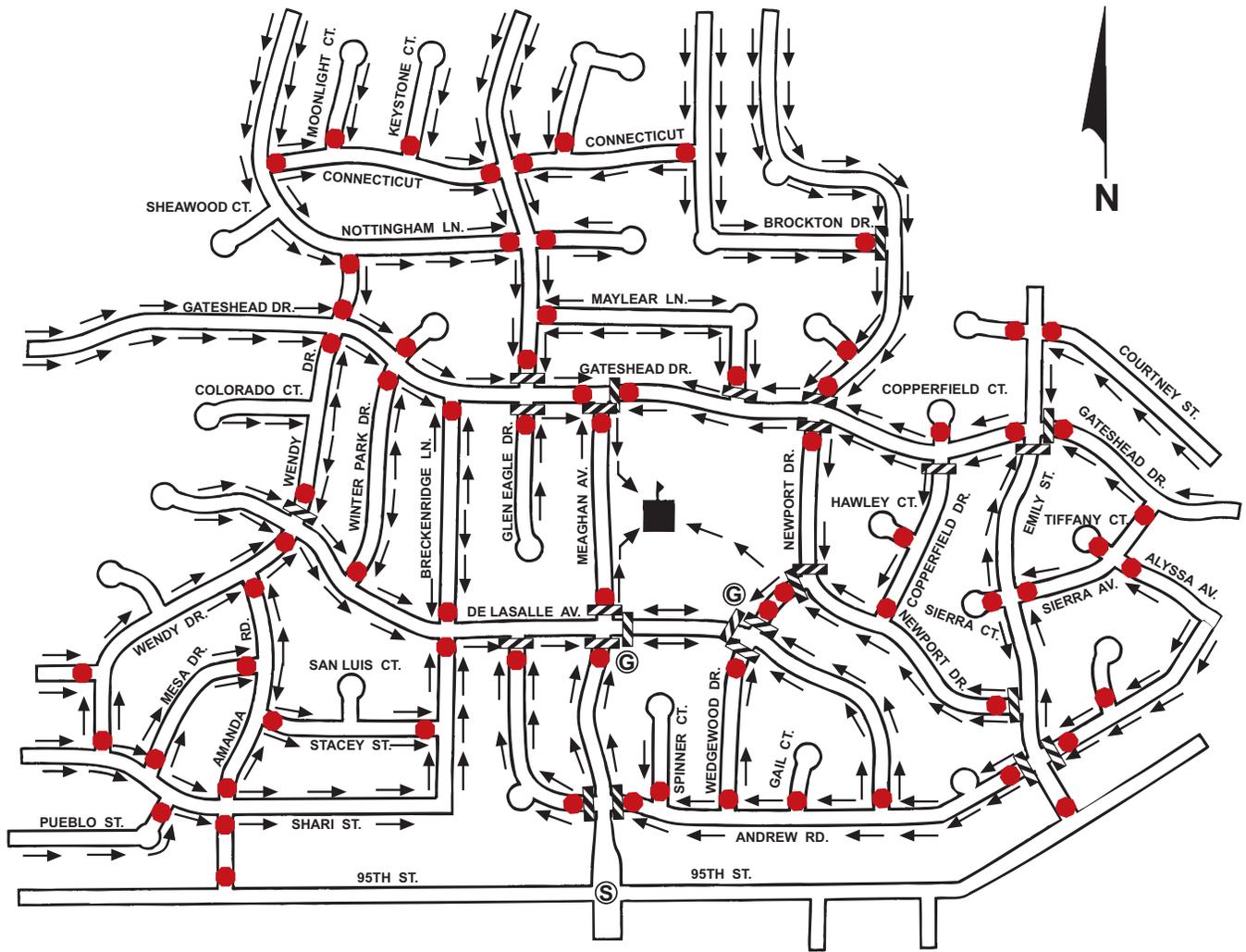
SPECIAL SITUATIONS

The language in the law specifically states that the school speed limits shall be in effect when children are present. The reduced school zone speed limits improve the reaction time for the driver and reduce the speed of vehicles so that children have time to make better judgments about crossing. Sometimes though, reduced speed limits near a school entrance can provide additional safety even though no children may be walking to school. Schools in rural locations may not have a walking population but they do experience traffic conflicts caused by buses and parents all arriving in a short time frame to drop off or pick up children. These entrances may be on high speed arterial type roads and the intense traffic at an isolated location may be unexpected by the driver.

Typically, these traffic problems can be resolved by traditional traffic engineering solutions such as turn lanes, advance signing or a traffic control device. Very high volumes of traffic may even warrant a signal. It is imperative to involve engineering professionals to evaluate the alternatives at these unique locations and determine the correct solution. Reducing the speed limit is only one of many tools available.

Since children are not present, and these roads may be high speed, a flashing beacon with the supplemental plaque WHEN FLASHING (S4-4P) is an appropriate treatment for the school speed limit. The beacon should only flash during the intense traffic periods at the beginning and end of the school day. Experienced engineering professionals should evaluate the traffic pattern and determine these time frames.

Figure 1



Legend

- | | |
|--|--|
|  SCHOOL |  SIGNAL |
|  CROSSWALK |  STOP |
|  CROSSING GUARD |  PEDESTRIAN ROUTE |

MN MUTCD, Figure 7A-1. Example of School Route Plan Map

Figure 2

Sample

Tabular Listing of Safety Issues for Obama Elementary School

Problem Number : #1

Location: On Ford St. between Lincoln Rd. and Victoria Rd.
Description: Sidewalk broken with missing sections
Extent: 440 feet, children walking in the street
Posted Speed: 30 MPH
Traffic Volume: 150 vph during school walking time - 7-8 AM : 3-4 PM
Number of Students Affected: 30 students, elementary age
Recommended Action: Advise city public works to replace sidewalk.

Problem Number : #2

Location: Chrysler Ave. intersection with Ford St.
Description: Chrysler Ave. is a 5-lane road
Extent: Very wide, 66 feet. with no supervision.
Posted Speed: 35 MPH
Traffic Volume: 400 vph during school opening and closing hours
Number of Students Affected: 50 Elementary children crossing
Recommended Action: School District needs to provide adult crossing guard

Problem Number : #3

Location: State Trunk Highway Route 66
Description: School Advance Sign S1-1 is completely dark at night
Extent: MN MUTCD requires sign to be reflective at night
Posted Speed: 40 MPH
Traffic Volume: AADT 3000
Number of Students Affected: Many - This is primary bus entrance and student pick up area for extracurricular activities.
Recommended Action: Advise state transportation department to replace non-retroreflective sign to improve drivers' awareness of approaching school bus and student loading zone.

Problem Number : #4

Location: County Road 77 and Ford St.
Description: Crosswalk at intersection.
Extent: Crosswalk markings are nearly worn off where there are student crossing guards
Posted Speed: 30 MPH
Traffic Volume: 300 vph during school opening and closing hours
Number of Students Affected: 80 elementary and middle school students
Recommended Action: Contact the county engineer to repaint crosswalk or consider more durable pavement markings.

Figure 3

ROAD LOG (A)

EXAMPLE

ROAD 62nd Ave North
 CITY New Hills
 COUNTY Blue Earth
 FROM CSAH 18

DATE 5-3-2005
 PROCESSED BY E. Brown
 SHEET 1 of 4 SHEETS
 TO CSAH 8 (W. Broadway)

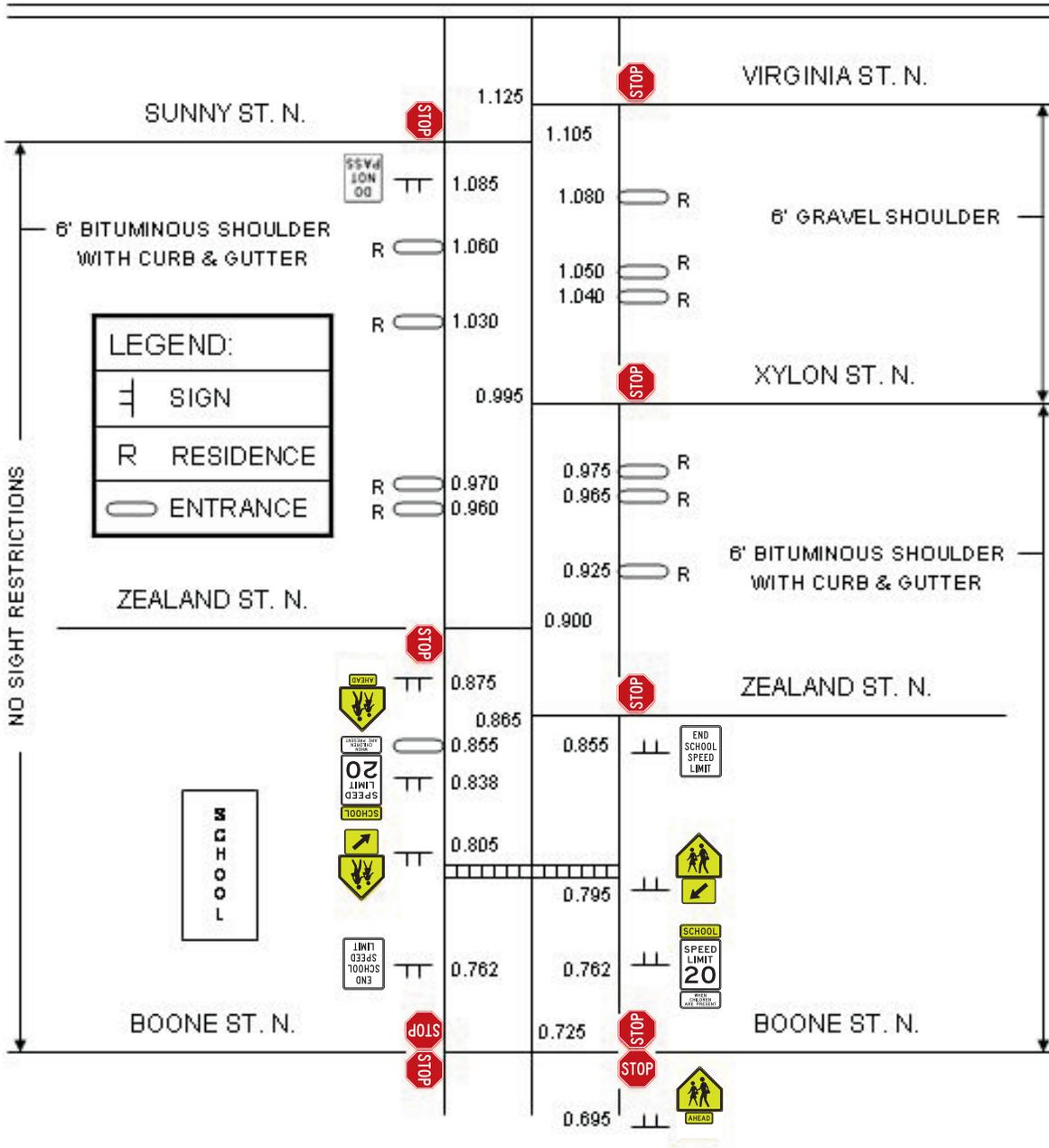


Figure 4

ROAD LOG (B)

EXAMPLE

DATE 5-3-2008 PROCESSED BY E. Brown
ROAD 62nd Ave North APPROX. LENGTH OF ZONE 0.3 miles

ROADWAY: SHOULDER:
TYPE Bituminous TYPE Bituminous
WIDTH 24' WIDTH 8'
CONDITION Fair CONDITION Good
PRESENT SPEED LIMIT 30 mph
SIGHT DISTANCE RESTRICTIONS None
SIDEWALK 3 ft CONDITION Good

VEHICULAR VOLUMES 2575 AADT
PEDESTRIAN VOLUMES 125 school children cross at school crossing.

ACCIDENT EXPERIENCE:
STUDY PERIOD 2002-2004
NUMBER OF CRASHES 6
NUMBER OF PEDESTRIAN CRASHES 0

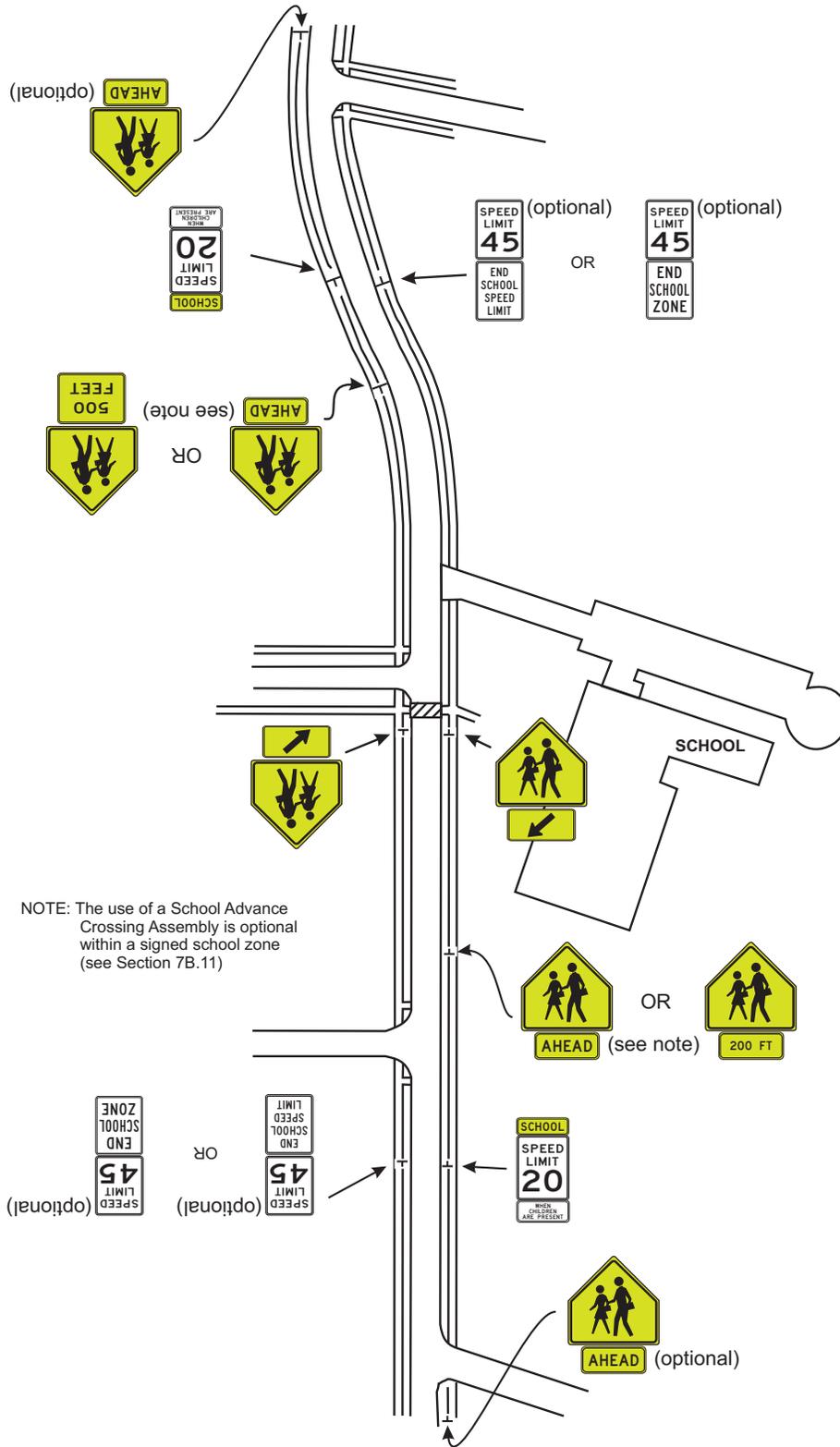
LAND USE Residential, School

CROSS TRAFFIC at Zealand St. AADT 500, Boone St. AADT 350, Xylon St
AADT 200, Sunny St AADT 250, Virginia St. AADT 300

General Comments:

Recommend restricting parking adjacent to school on both sides of 62nd Ave North.

Figure 5



MN MUTCD, Figure 7B-5. Examples of Signing for a School Zone with a School Speed Limit and a School Crossing

PHOTO CREDITS

Speed Display Sign picture - from www.walkinginfo.org - photographer Dan Burden, downloaded Aug 1, 2009

Route Plan, Traffic Volume, School Patrol and Pedestrian Waiting pictures from <http://www.pedbikeimages.org> - photographer Dan Burden, downloaded Aug 1, 2009

Pavement Marking, Broken Sidewalk and Parked Car pictures from www.safekids.org/walk/usa.html - photographer names not listed for security, downloaded Aug 1, 2009

Fenced Playground, Police Car by Sign, and Bump Out pictures -photographer Dan Brannan, Mn/DOT, Oct., 2009.

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- 4) **School Speed Limits and Speed in School Zones**, TRB Record # 1254, McCoy, P T, Heimann, J E, 1990
- 5) **Manual of Transportation Engineering Studies**, Institute of Transportation Engineers, Jan 2000
- 6) **School Safety Planning**, prepared by Goodell-Grivas, Inc., for the Michigan State Univ., distribution by Michigan Resource Center, Sept. 1996
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Part 8. TRAFFIC CONTROL FOR RAILROAD AND LIGHT RAIL TRANSIT GRADE CROSSINGS

Chapter 8B. Signs and Markings

8B.1 Purpose

SUPPORT:

Passive traffic control systems, consisting of signs and pavement markings only, identify and direct attention to the location of a grade crossing and advise road users to slow down or stop at the grade crossing as necessary in order to yield to any rail traffic occupying, or approaching and in proximity to, the grade crossing.

Signs and markings regulate, warn, and guide the road users so that they, as well as LRT vehicle operators on mixed-use alignments, can take appropriate action when approaching a grade crossing.

STANDARD:

The design and location of signs shall comply with the provisions of Part 2. The design and location of pavement markings shall comply with the provisions of Part 3.

8B.2 Sizes of Grade Crossing Signs

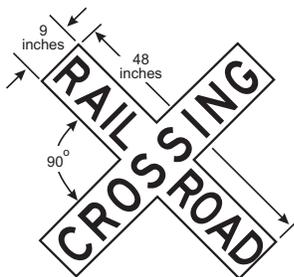
STANDARD:

The sizes of grade crossing signs shall be as shown in Table 8B-1 and Appendix C of this Manual.

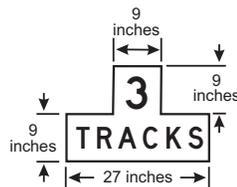
OPTION:

Signs larger than those shown in Table 8B-1 and Appendix C of this Manual may be used (see Section 2A.11).

8B.3 Grade Crossing (Crossbuck) Sign (R15-1) and Number of Tracks Plaque (R15-2P) at Active and Passive Grade Crossings



R15-1
Drilled for 90-degree mounting



R15-2P

STANDARD:

The Grade Crossing sign (R15-1), commonly identified as the Crossbuck sign, shall be retroreflectorized white with the words RAILROAD CROSSING in black lettering, mounted as shown in Figure 8B-2

SUPPORT:

In most States, the Crossbuck sign requires road users to yield the right-of-way to rail traffic at a grade crossing.

STANDARD:

As a minimum, one Crossbuck sign shall be used on each roadway approach to every highway-rail grade crossing, alone or in combination with other traffic control devices.

OPTION:

A Crossbuck sign may be used on a highway approach to a highway-LRT grade crossing on a semi-exclusive or mixed-use alignment, alone or in combination with other traffic control devices.

STANDARD:

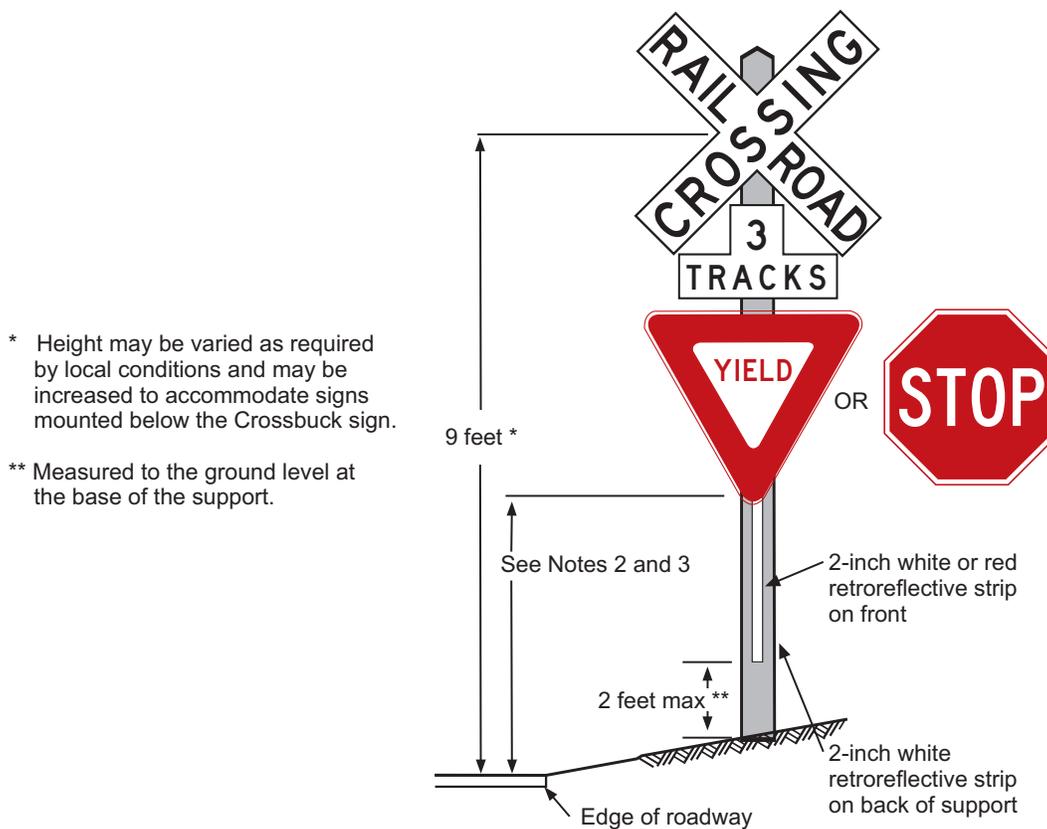
If automatic gates are not present and if there are two or more tracks at a grade crossing, the number of tracks shall be indicated on a supplemental Number of Tracks (R15-2P) plaque of inverted T shape mounted below the Crossbuck sign in the manner shown in Figure 8B-2.

On each approach to a highway-rail grade crossing and, if used, on each approach to a highway-LRT grade crossing, the Crossbuck sign shall be installed on the right-hand side of the highway on each approach to the grade crossing. Where restricted sight distance or unfavorable highway geometry exists on an approach to a grade crossing, an additional Crossbuck sign shall be installed on the left-hand side of the highway, possibly placed back-to-back with the Crossbuck sign for the opposite approach, or otherwise located so that two Crossbuck signs are displayed for that approach.

Sign or Plaque	Sign Designation	Section	Conventional Road		Expressway	Minimum	Oversized
			Single Lane	Multi-Lane			
Stop	R1-1	8B.4 8B.5	30 x 30	36 x 36	36 x 36	---	48 x 48
Yield	R1-2	8B.4 8B.5	36 x 36 x 36	48 x 48 x 48	48 x 48 x 48	30 x 30 x 30	---
No Right Turn Across Tracks	R3-1a	8B.8	24 x 30	30 x 36	---	---	---
No Left Turn Across Tracks	R3-2a	8B.8	24 x 30	30 x 36	---	---	---
Do Not Stop on Tracks	R8-8	8B.9	24 x 30	24 x 30	36 x 48	---	36 x 48
Tracks Out of Service	R8-9	8B.10	24 x 24	24 x 24	36 x 36	---	36 x 36
Stop Here When Flashing	R8-10	8B.11	24 x 36	24 x 36	---	---	36 x 48
Stop Here When Flashing	R8-10a	8B.11	24 x 30	24 x 30	---	---	36 x 42
Stop Here on Red	R10-6	8B.12	24 x 36	24 x 36	---	---	36 x 48
Stop Here on Red	R10-6a	8B.12	24 x 30	24 x 30	---	---	36 x 42
Grade Crossing (Crossbuck)	R15-1	8B.3	48 x 9	48 x 9	---	---	---
Number of Tracks (plaque)	R15-2P	8B.3	27 x 18	27 x 18	---	---	---
Exempt (plaque)	R15-3P	8B.7	24 x 12	24 x 12	---	---	---
Light Rail Only Right Lane	R15-4a	8B.13	24 x 30	24 x 30	---	---	---
Light Rail Only Left Lane	R15-4b	8B.13	24 x 30	24 x 30	---	---	---
Light Rail Only Center Lane	R15-4c	8B.13	24 x 30	24 x 30	---	---	---
Light Rail Do Not Pass	R15-5	8B.14	24 x 30	24 x 30	---	---	---
Do Not Pass Stopped Train	R15-5a	8B.14	24 x 30	24 x 30	---	---	---
No Motor Vehicles on Tracks symbol	R15-6	8B.15	24 x 24	24 x 24	---	---	---
Do Not Drive on Tracks	R15-6a	8B.15	24 x 30	24 x 30	---	---	---
Light Rail Divided Highway symbol	R15-7	8B.16	24 x 24	24 x 24	---	---	---
Light Rail Divided Highway symbol (T-Intersection)	R15-7a	8B.16	24 x 24	24 x 24	---	---	---
Look	R15-8	8B.17	36 x 18	36 x 18	---	---	---
Grade Crossing Advance Warning	W10-1	8B.6	36 Dia.	36 Dia.	48 Dia.	---	48 Dia.
Exempt (plaque)	W10-1aP	8B.7	24 x 12	24 x 12	---	---	---
Grade Crossing and Intersection Advance Warning	W10-2,3,4	8B.6	36 x 36	36 x 36	48 x 48	---	48 x 48
Low Ground Clearance	W10-5	8B.23	36 x 36	36 x 36	48 x 48	---	48 x 48
Low Ground Clearance (plaque)	W10-5P	8B.23	30 x 24	30 x 24	---	---	---
Light Rail Activated Blank-Out symbol	W10-7	8B.19	24 x 24	24 x 24	---	---	---
Trains May Exceed 80 MPH	W10-8	8B.20	36 x 36	36 x 36	48 x 48	---	48 x 48
No Train Horn	W10-9	8B.21	36 x 36	36 x 36	48 x 48	---	48 x 48
No Train Horn (plaque)	W10-9P	8B.21	30 x 24	30 x 24	---	---	---
Storage Space symbol	W10-11	8B.24	36 x 36	36 x 36	48 x 48	---	48 x 48
Storage Space XX Feet Between Tracks & Highway	W10-11a	8B.24	30 x 36	30 x 36	---	---	---
Storage Space XX Feet Between Tracks & Tracks Behind You	W10-11b	8B.24	30 x 36	30 x 36	---	---	---
Skewed Crossing	W10-12	8B.25	36 x 36	36 x 36	48 x 48	---	48 x 48
No Gates or Lights (plaque)	W10-13P	8B.22	30 x 24	30 x 24	---	---	---
Next Crossing (plaque)	W10-14P	8B.23	30 x 24	30 x 24	---	---	---
Use Next Crossing (plaque)	W10-14aP	8B.23	30 x 24	30 x 24	---	---	---
Rough Crossing (plaque)	W10-15P	8B.23	30 x 24	30 x 24	---	---	36 x 30
Hidden Crossing	W10-X2	8B.6.1	36 x 36	36 x 36	48 x 48	---	48 x 48
Look for Trains (w/arrows)	W10-X3	8B.6.1	36 x 36	36 x 36	48 x 48	---	48 x 48

- Notes: 1. Larger signs may be used when appropriate.
2. Dimensions in inches are shown as width x height.
3. Table 9B-1 shows the minimum sizes that may be used for grade crossing signs and plaques that face shared-use paths and pedestrian facilities.

Table 8B-1. Grade Crossing Sign and Plaque Minimum Sizes



Notes:

1. YIELD or STOP signs are used only at passive crossings. A STOP sign is used only if an engineering study determines that it is appropriate for that particular approach.
2. Mounting height shall be at least 4 feet for installations of YIELD or STOP signs on existing Crossbuck sign supports.
3. Mounting height shall be at least 7 feet for new installations in areas with pedestrian movements or parking.

Figure 8B-2. Crossbuck Assembly with a YIELD or STOP Sign on the Crossbuck Sign Support

A strip of retroreflective white material not less than 2 inches in width shall be used on each support at passive highway-rail grade crossings. It shall extend for the full length of the front and back of the support from beneath the Crossbuck sign or Number of Tracks sign to within 2 feet above the edge of the roadway.

Compliance Date: December 31, 2019

GUIDANCE:

Crossbuck signs should be located with respect to the highway pavement or shoulder in accordance with the criteria in Chapter 2A and Figures 2A-2 and 2A-3, and should be located with respect to the nearest track in accordance with Figure 8C-2.

The minimum lateral offset for the nearest edge of the Crossbuck sign should be 6 feet from the edge of the shoulder or 12 feet from the edge of the traveled way in rural areas (whichever is greater), and 2 feet from the face of the curb in urban areas.

Where unusual conditions make variations in location and lateral offset appropriate, engineering judgment should be used to provide the best practical combination of view and safety clearances.

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8B.4 Crossbuck Assemblies with YIELD or STOP Signs at Passive Grade Crossings



STANDARD:

A grade crossing Crossbuck Assembly shall consist of a Crossbuck (R15-1) sign, and a Number of Tracks (R15-2P) plaque if two or more tracks are present, that complies with the provisions of Section 8B.3, and either a YIELD (R1-2) or STOP (R1-1) sign installed on the same support, except as provided in the following option. If used at a passive grade crossing, a YIELD or STOP sign shall be installed in compliance with the provisions of Part 2, Section 2B.10, and Figures 8B-2 and 8B-3.

Compliance Date: December 31, 2019

SUPPORT:

Sections 8A.2 and 8A.3 contain information regarding the responsibilities of the highway agency and the railroad company or LRT agency regarding the selection, design, and operation of traffic control devices placed at grade crossings.

OPTION:

If a YIELD or STOP sign is installed for a Crossbuck Assembly at a grade crossing, it may be installed on the same support as the Crossbuck sign or it may be installed on a separate support at a point where the highway vehicle is to stop, or as near to that point as practical, but in either case, the YIELD or STOP sign is considered to be a part of the Crossbuck Assembly.

STANDARD:

If a YIELD or STOP sign is installed on an existing Crossbuck sign support, the minimum height, measured vertically from the bottom of the YIELD or STOP sign to the top of the curb, or in the absence of curb, measured vertically from the bottom of the YIELD or STOP sign to the elevation of the near edge of the traveled way, shall be 4 feet (see Figure 8B-2).

If a Crossbuck Assembly is installed on a new sign support (see Figure 8B-2) or if the YIELD or STOP sign is installed on a separate support (see Figure 8B-3), the minimum height, measured vertically from the bottom of the YIELD or STOP sign to the top of the curb, or in the absence of curb, measured vertically from the bottom of the YIELD or STOP sign to the elevation of the near edge of the traveled way, shall be 7 feet if the Crossbuck Assembly is installed in an area where parking or pedestrian movements are likely to occur.

GUIDANCE:

If a YIELD or STOP sign is installed for a Crossbuck Assembly at a grade crossing on a separate support than the Crossbuck sign (see Figure 8B-3), the YIELD or STOP sign should be placed at a point where the highway vehicle is to stop, or as near to that point as practical, but no closer than 15 feet measured perpendicular from the nearest rail.

SUPPORT:

The meaning of a Crossbuck Assembly that includes a YIELD sign is that a road user approaching the grade crossing needs to be prepared to decelerate, and when necessary, yield the right-of-way to any rail traffic that might

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At all public highway-rail grade crossings that are not equipped with the active traffic control systems that are described in Chapter 8C, except crossings where road users are directed by an authorized person on the ground to not enter the crossing at all times that an approaching train is about to occupy the crossing, a Crossbuck Assembly shall be installed on the right-hand side of the highway on each approach to the highway-rail grade crossing.

If a Crossbuck sign is used on a highway approach to a public highway-LRT grade crossing that is not equipped with the active traffic control systems that are described in Chapter 8C, a Crossbuck Assembly shall be installed on the right-hand side of the highway on each approach to the highway-LRT grade crossing.

Where restricted sight distance or unfavorable highway geometry exists on an approach to a grade crossing that has a Crossbuck Assembly, or where there is a one-way multi-lane approach, an additional Crossbuck Assembly shall be installed on the left-hand side of the highway.

A YIELD sign shall be the default traffic control device for Crossbuck Assemblies on all highway approaches to passive grade crossings unless an engineering study performed by the regulatory agency or highway authority having jurisdiction over the roadway approach determines that a STOP sign is appropriate.

GUIDANCE:

The use of STOP signs at passive grade crossings should be limited to unusual conditions where requiring all highway vehicles to make a full stop is deemed essential by an engineering study. Among the factors that should be

be occupying the crossing or might be approaching and in such close proximity to the crossing that it would be unsafe for the road user to cross.

Certain commercial motor vehicles and school buses are required to stop at all grade crossings in accordance with 49 CFR 392.10 even if a YIELD sign (or just a Crossbuck sign) is posted.

The meaning of a Crossbuck Assembly that includes a STOP sign is that a road user approaching the grade crossing must come to a full and complete stop not less than 15 feet short of the nearest rail, and remain stopped while the road user determines if there is rail traffic either occupying the crossing or approaching and in such close proximity to the crossing that the road user must yield the right-of-way to rail traffic. The road user is permitted to proceed when it is safe to cross.

STANDARD:

A vertical strip of retroreflective white material, not less than 2 inches in width, shall be used on each Crossbuck support at passive grade crossings for the full length of the back of the support from the Crossbuck sign or Number of Tracks plaque to within 2 feet above the ground, except as provided in the following option.

Compliance Date: December 31, 2019

OPTION:

The vertical strip of retroreflective material may be omitted from the back sides of Crossbuck sign supports installed on one-way streets.

If a YIELD or STOP sign is installed on the same support as the Crossbuck sign, a vertical strip of red (see Section 2A.21) or white retroreflective material that is at least 2 inches wide may be used on the front of the support from the YIELD or STOP sign to within 2 feet above the ground.

STANDARD:

If a Crossbuck sign support at a passive grade crossing does not include a YIELD or STOP sign (either because the YIELD or STOP sign is placed on a separate support or because a YIELD or STOP sign is not present on the approach), a vertical strip of retroreflective white material, not less than 2 inches in width, shall be used for the full length of the front of the support from the Crossbuck sign or Number of Tracks plaque to within 2 feet above the ground.

Compliance Date: December 31, 2019

At all grade crossings where YIELD or STOP signs are installed, Yield Ahead (W3-2) or Stop Ahead (W3-1) signs shall also be installed if the criteria for their installation in Section 2C.36 are met.

SUPPORT:

Section 8B.28 contains provisions regarding the use of stop lines or yield lines at grade crossings.

8B.5 Use of STOP (R1-1) or YIELD (R1-2) Signs without Crossbuck Signs at Highway-LRT Grade Crossings



R1-1

R1-2

STANDARD:

For all highway-LRT grade crossings where only STOP (R1-1) or YIELD (R1-2) signs are installed, the placement shall comply with the requirements of Section 2B.10. Stop Ahead (W3-1) or Yield Ahead (W3-2) Advance Warning signs (see Figure 2C-6) shall also be installed if the criteria for their installation given in Section 2C.36 are met.

GUIDANCE:

The use of only STOP or YIELD signs for road users at highway-LRT grade crossings should be limited to those crossings where the need and feasibility is established by an engineering study. Such crossings should have all of the following characteristics:

- A. The crossing roadways should be secondary in character (such as a minor street with one lane in each direction, an alley, or a driveway) with low traffic volumes and low speed limits. The specific thresholds of traffic volumes and speed limits should be determined by the local agencies.
- B. LRT speeds do not exceed 25 mph.
- C. The line of sight for an approaching LRT operator is adequate from a sufficient distance such that the operator can sound an audible signal and bring the LRT equipment to a stop before arriving at the crossing.
- D. The road user has sufficient sight distance at the stop line to permit the vehicle to cross the tracks before the arrival of the LRT equipment.
- E. If at an intersection of two roadways, the intersection does not meet the warrants for a traffic control signal as provided in Chapter 4C.
- F. The LRT tracks are located such that highway vehicles are not likely to stop on the tracks while waiting to enter a cross street or highway.

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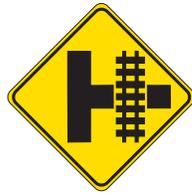
8B.6 Grade Crossing Advance Warning Signs (W10 Series)



W10-1



W10-2



W10-3



W10-4

STANDARD:

A Grade Crossing Advance Warning (W10-1) sign (see Figure 8B-4) shall be used on each highway in advance of every highway-rail grade crossing, and every highway-LRT grade crossing in semi-exclusive alignments, except in the following circumstances:

- A. On an approach to a grade crossing from a T-intersection with a parallel highway if the distance from the edge of the track to the edge of the parallel roadway is less than 100 feet and W10-3 signs are used on both approaches of the parallel highway;
- B. On low-volume, low-speed highways crossing minor spurs or other tracks that are infrequently used and road users are directed by an authorized person on the ground to not enter the crossing at all times that approaching rail traffic is about to occupy the crossing;
- C. In business or commercial areas where active grade crossing traffic control devices are in use; or
- D. Where physical conditions do not permit even a partially effective display of the sign.

The placement of the Grade Crossing Advance Warning sign shall be in accordance with Section 2C.5 and Table 2C-4.



W3-1



W3-2

A Yield Ahead (W3-2) or Stop Ahead (W3-1) Advance Warning sign shall also be installed if the criteria for their installation given in Section 2C.36 are met. If a Yield Ahead or Stop Ahead sign is installed on the approach to the crossing, the W10-1 sign shall be installed upstream from the Yield Ahead or Stop Ahead sign. The Yield Ahead or Stop Ahead sign shall be located in accordance with Table 2C-4. The minimum distance between the signs shall be in accordance with Section 2C.5 and Table 2C-4.

OPTION:

On divided highways and one-way roads, an additional W10-1 sign may be erected on the left side of the roadway.

STANDARD:

If the distance between the railroad tracks and the parallel highway, from the edge of the track to the edge of the parallel highway, is less than 100 feet, the W10-2, W10-3, or W10-4 signs shall be used on each approach of the parallel highway to warn road users making a turn that they will encounter a highway-rail grade crossing soon after making a turn, and a W10-1 sign for the approach to the tracks shall not be required to be between the tracks and the parallel highway.

If the W10-2, W10-3, or W10-4 signs are used, sign placement shall be in accordance with the guidelines for Intersection Warning signs in Table 2C-4 in Chapter 2C (using the speed of the turning maneuver), through traffic and shall be measured from the highway intersection.

GUIDANCE:

If the distance between the railroad tracks and the parallel highway, from the edge of the tracks to the edge of the parallel roadway, is 100 feet or more, a W10-1 sign should be installed in advance of the parallel highway-rail grade crossing, and the W10-2, W10-3, or W10-4 signs should not be used on the parallel highway.

8B.6.1 Supplemental Grade Crossing Advance Warning Signs (W10-X2, W10-X3)



W10-X2



W10-X3

STANDARD:

These signs shall be used in advance of non-signalized railroad crossings, where conditions indicate the need for additional advance warning supplementing that provided by the Highway-Rail Grade Crossing Advance Warning sign (W10-1). They shall always be preceded on the approach by the W10-1 sign.

GUIDANCE:

The use of these signs should be based on an investigation of pertinent conditions at the crossing, such as train and vehicle speeds, sight distance or obstructions, stopping distances and similar conditions.

SUPPORT:

The HIDDEN CROSSING sign (W10-X2) warns of sight obstructions at the crossing area calling for added vigilance on the part of the motorist.

The LOOK FOR TRAINS sign (W10-X3) is a supplemental sign used to warn the motorist of his obligation to determine whether or not it is safe for him to proceed over the crossing. It could logically follow the HIDDEN CROSSING sign for additional emphasis.

OPTION:

Appropriate advisory speed plates may be mounted beneath any railroad advance warning sign to indicate the safe vehicle approach speed to the crossing.

8B.7 EXEMPT Grade Crossing Plaques (R15-3P, W10-1aP)



R15-3P



W10-1aP

OPTION:

When authorized by law or regulation, a supplemental EXEMPT (R15-3P) plaque (see Figure 8B-1) with a white background may be used below the Crossbuck sign or Number of Tracks plaque, if present, at the grade crossing, and a supplemental EXEMPT (W10-1aP) plaque (see Figure 8B-4) with a yellow background may be used below the Grade Crossing Advance Warning (W10 series) sign.

Where neither the Crossbuck sign nor the advance warning signs exist for a particular highway-LRT grade crossing, an EXEMPT (R15-3P) plaque with a white background may be placed on its own post on the near right-hand side of the approach to the crossing.

SUPPORT:

Minnesota Statutes (169.28 and 169.29) state that:

"No stop need be made at a crossing on a rail line on which service has been abandoned and where a sign erected in conformance with section 169.06 and bearing the word "Exempt" has been installed, unless directed otherwise by a flagman. The installation or presence of an exempt sign shall not relieve any driver of the duty to use due care."

8B.8 Turn Restrictions During Preemption



R3-1a



R3-2a

GUIDANCE:

At a signalized intersection that is located within 200 feet of a highway-rail grade crossing, measured from the edge of the track to the edge of the roadway, where the intersection traffic control signals are preempted by the approach of a train, all existing turning movements toward the highway-rail grade crossing should be prohibited during the signal preemption sequences.

OPTION:

A blank-out or changeable message sign and/or appropriate highway traffic signal indication or other similar type sign may be used to prohibit turning movements toward the highway-rail grade crossing during preemption. The R3-1a and R3-2a signs shown in Figure 8B-1 may be used for this purpose.

SUPPORT:

LRT operations can include the use of activated blank-out sign technology for turn prohibition signs. The signs are typically used on roads paralleling a semi exclusive or mixed-use LRT alignment where road users might turn across the LRT tracks. A blank-out sign displays its message only when activated. When not activated, the sign face is blank.

GUIDANCE:

An LRT-activated blank-out turn prohibition (R3-1a or R3-2a) sign should be used where an intersection adjacent to a highway-LRT crossing is controlled by STOP signs, or is controlled by traffic control signals with permissive turn movements for road users crossing the tracks.

OPTION:

An LRT-activated blank-out turn prohibition (R3-1a or R3-2a) sign may be used for turning movements that cross the tracks.

As an alternative to LRT-activated blank-out turn prohibition signs at intersections with traffic control signals, exclusive traffic control signal phases such that all movements that cross the tracks have a steady red indication may be used in combination with No Turn on Red (R10-11, R10-11a, or R10-11b) signs (see Section 2B.53).

STANDARD:

Turn prohibition signs that are associated with preemption shall be visible or activated only when the grade crossing restriction is in effect.

8B.9 DO NOT STOP ON TRACKS Sign (R8-8)



R8-8

GUIDANCE:

A DO NOT STOP ON TRACKS (R8-8) sign (see Figure 8B-1) should be installed whenever an engineering study determines that the potential for highway vehicles stopping on the tracks at a grade crossing is significant. Placement of the R8-8 sign should be determined as part of the engineering study. The sign, if used, should be located on the right-hand side of the highway on either the near or far side of the grade crossing, depending upon which position provides better visibility to approaching drivers.

If a STOP or YIELD sign is installed at a location, including at a circular intersection, that is downstream from the grade crossing such that highway vehicle queues are likely to extend beyond the tracks, a DO NOT STOP ON TRACKS sign (R8-8) should be used.

OPTION:

DO NOT STOP ON TRACKS signs may be placed on both sides of the track.

On divided highways and one-way streets, a second DO NOT STOP ON TRACKS sign may be placed on the near or far left-hand side of the highway at the grade crossing to further improve visibility of the sign.

8B.16 Divided Highway With Light Rail Transit Crossing Signs (R15-7 Series)



R15-7



R15-7a

OPTION:

The Divided Highway With Light Rail Transit Crossing (R15-7) sign may be used as a supplemental sign on the approach legs of a roadway that intersects with a divided highway where LRT equipment operate in the median. The sign may be placed beneath a STOP sign or mounted separately.

GUIDANCE:

The number of tracks displayed on the R15-7 sign should be the same as the actual number of tracks.

STANDARD:

When the Divided Highway With Light Rail Transit Crossing sign is used at a four-legged intersection, the R15-7 sign shall be used. When used at a T-intersection, the R15-7a sign shall be used.

8B.17 LOOK Sign (R15-8)



R15-8

OPTION:

At grade crossings, the LOOK (R15-8) sign may be mounted as a supplemental plaque on the Crossbuck support, or on a separate post in the immediate vicinity of the grade crossing on the railroad or LRT right-of-way.

GUIDANCE:

A LOOK sign should not be mounted as a supplemental plaque on a Crossbuck Assembly that has a YIELD or STOP sign mounted on the same support as the Crossbuck.

8B.18 Emergency Notification Sign (I-13)



I-13

GUIDANCE:

Emergency Notification (I-13) signs should be installed at all highway-rail grade crossings, and at all highway-LRT grade crossings on semi-exclusive alignments, to provide information to road users so that they can notify the railroad company or LRT agency about emergencies or malfunctioning traffic control devices.

STANDARD:

When Emergency Notification signs are used at a highway-rail grade crossing, they shall, at a minimum, include the USDOT grade crossing inventory number and the emergency contact telephone number.

When Emergency Notification signs are used at a highway-LRT grade crossing, they shall, at a minimum, include a unique crossing identifier and the emergency contact telephone number.

Emergency Notification Signs shall have a white legend and border on a blue background.

The Emergency Notification signs shall be positioned so as to not obstruct any traffic control devices or limit the view of rail traffic approaching the grade crossing.

GUIDANCE:

Emergency Notification signs should be retroreflective.

Emergency Notification signs should be oriented so as to face highway vehicles stopped on or at the grade crossing or on the traveled way near the grade crossing.

At station crossings, Emergency Notification signs or information should be posted in a conspicuous location.

Emergency Notification signs mounted on Crossbuck Assemblies or signal masts should only be large enough to provide the necessary contact information. Use of larger signs that might obstruct the view of rail traffic or other highway vehicles should be avoided.

8B.19 Light Rail Transit Approaching-Activated Blank-Out Warning Sign (W10-7)



W10-7

SUPPORT:

The Light Rail Transit Approaching-Activated Blank-Out (W10-7) warning sign supplements the traffic control devices to warn road users crossing the tracks of approaching LRT equipment.

OPTION:

A Light Rail Transit Approaching-Activated Blank-Out warning sign may be used at signalized intersections near highway-LRT grade crossings or at crossings controlled by STOP signs or automatic gates.

8B.20 TRAINS MAY EXCEED 80 MPH Sign (W10-8)



W10-8

GUIDANCE:

Where trains are permitted to travel at speeds exceeding 80 mph, a TRAINS MAY EXCEED 80 MPH (W10-8) sign (see Figure 8B-4) should be installed facing road users approaching the highway-rail grade crossing.

If used, the TRAINS MAY EXCEED 80 MPH signs should be installed between the Grade Crossing Advance Warning (W10 series) sign (see Figure 8B-4) and the highway-rail grade crossing on all approaches to the highway-rail grade crossing. The locations should be determined based on specific site conditions.

8B.21 NO TRAIN HORN Sign and Plaque (W10-9, W10-9P)



W10-9



W10-9P

STANDARD:

Either a NO TRAIN HORN (W10-9) sign or a NO TRAIN HORN (W10-9P) plaque shall be installed in each direction at each highway-rail grade crossing where a quiet zone has been established in compliance with 49 CFR Part 222. If a W10-9P plaque is used, it shall supplement and be mounted directly below the Grade Crossing Advance Warning (W10-1 series) sign.

8B.22 NO GATES OR LIGHTS Plaque (W10-13P)

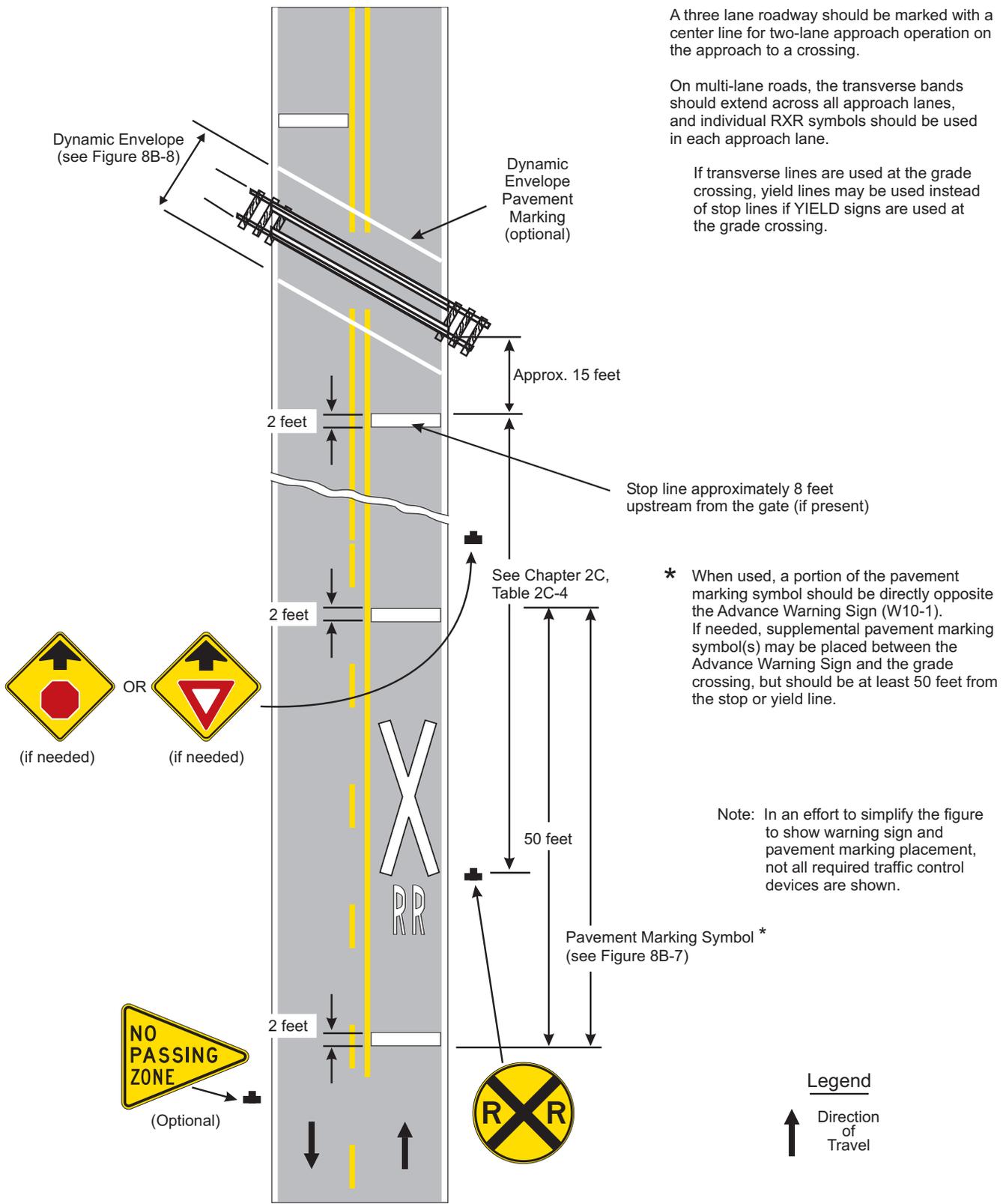


W10-13P

OPTION:

The NO GATES OR LIGHTS (W10-13P) plaque may be mounted below the Grade Crossing Advance Warning (W10 series) sign at grade crossings that are not equipped with automated signals.

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A three lane roadway should be marked with a center line for two-lane approach operation on the approach to a crossing.

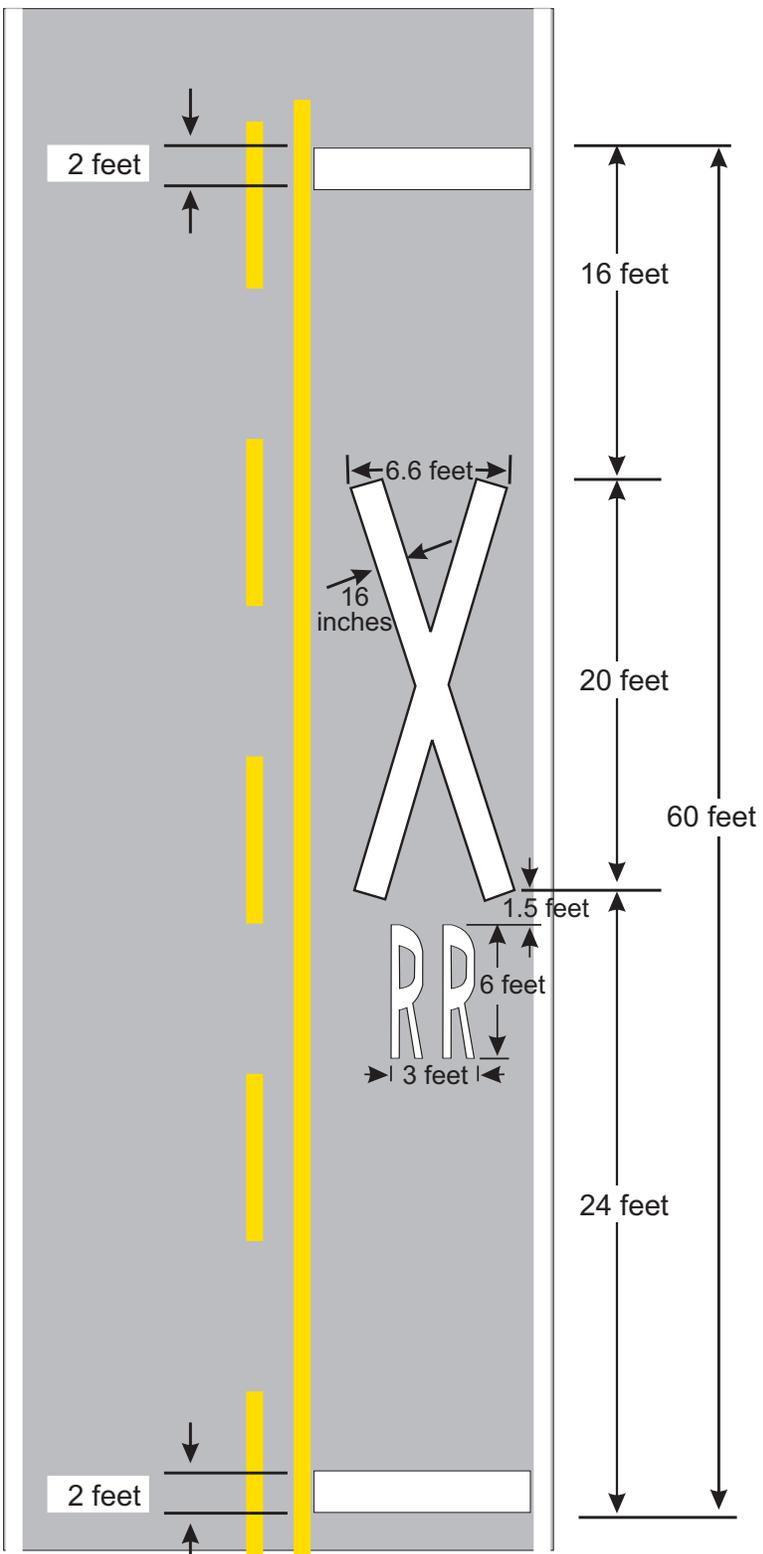
On multi-lane roads, the transverse bands should extend across all approach lanes, and individual RXR symbols should be used in each approach lane.

If transverse lines are used at the grade crossing, yield lines may be used instead of stop lines if YIELD signs are used at the grade crossing.

* When used, a portion of the pavement marking symbol should be directly opposite the Advance Warning Sign (W10-1). If needed, supplemental pavement marking symbol(s) may be placed between the Advance Warning Sign and the grade crossing, but should be at least 50 feet from the stop or yield line.

Note: In an effort to simplify the figure to show warning sign and pavement marking placement, not all required traffic control devices are shown.

Figure 8B-6. Example of Placement of Warning Signs and Pavement Markings at Grade Crossings



Note: Refer to Figure 8B-6 for placement

Figure 8B-7. Grade Crossing Pavement Markings

8C.2 Flashing-Light Signals

SUPPORT:

Section 8C.3 contains additional information regarding flashing-light signals at highway-LRT grade crossings in semi-exclusive and mixed-use alignments.

STANDARD:

If used, the flashing-light signal assembly (shown in Figure 8C-1) on the side of the highway shall include a standard Crossbuck (R15-1) sign, and where there is more than one track, a supplemental Number of Tracks (R15-2P) plaque, all of which indicate to motorists, bicyclists, and pedestrians the location of a grade crossing.

OPTION:

At highway-rail grade crossings, bells or other audible warning devices may be included in the assembly and may be operated in conjunction with the flashing lights to provide additional warning for pedestrians, bicyclists, and/or other non-motorized road users.

STANDARD:

When indicating the approach or presence of rail traffic, the flashing-light signal shall display toward approaching highway traffic two red lights mounted in a horizontal line flashing alternately.

If used, flashing-light signals shall be placed to the right of approaching highway traffic on all highway approaches to a grade crossing. They shall be located laterally with respect to the highway in compliance with Figure 8C-1 except where such location would adversely affect signal visibility.

If used at a grade crossing with highway traffic in both directions, back-to-back pairs of lights shall be placed on each side of the tracks. On multi-lane one-way streets and divided highways, flashing-light signals shall be placed on the approach side of the grade crossing on both sides of the roadway or shall be placed above the highway.

Each red signal unit in the flashing-light signal shall flash alternately. The number of flashes per minute for each lamp shall be 35 minimum and 65 maximum. Each lamp shall be illuminated approximately the same length of time. Total time of illumination of each pair of lamps shall be the entire operating time. Flashing-light units shall use either 8-inch or 12-inch nominal diameter lenses.

Flashing-light signal lenses shall be 12 inch in all new installations of grade crossing traffic control signals.

Grade crossing flashing-light signals shall operate at a low voltage using storage batteries either as a primary or stand-by source of electrical energy. Provision shall be made to provide a source of energy for charging batteries.

OPTION:

Additional pairs of flashing-light units may be mounted on the same supporting post and directed toward vehicular traffic approaching the grade crossing from other than the principal highway route, such as where there are approaching routes on highways closely adjacent to and parallel to the railroad.

STANDARD:

References to lenses in this Section shall not be used to limit flashing-light signal optical units to incandescent lamps within optical assemblies that include lenses.

SUPPORT:

Research has resulted in flashing-light signal optical units that are not lenses, such as, but not limited to, light emitting diode (LED) flashing-light signal modules.

OPTION:

Flashing-light signals may be installed on overhead structures or overhead supports as shown in Figure 8C-1 where needed for additional emphasis, or for better visibility to approaching traffic, particularly on multi-lane approaches or highways with profile restrictions.

If it is determined by an engineering study that one set of flashing lights on the cantilever arm is not sufficiently visible to road users, one or more additional sets of flashing lights may be mounted on the supporting post and/or on the cantilever arm.

STANDARD:

Breakaway or frangible bases shall not be used for overhead structures or cantilever supports.

Except as otherwise provided in the above option and the previous sentence, flashing-light signals mounted overhead shall comply with the applicable provisions of this Section.

8C.3 Flashing-Light Signals at Highway-LRT Grade Crossings

SUPPORT:

Section 8C.02 contains additional provisions regarding the design and operation of flashing-light signals, including those installed at highway-LRT grade crossings.

STANDARD:

Highway-LRT grade crossings in semi-exclusive alignments shall be equipped with flashing-light signals where LRT speeds exceed 35 mph. Flashing-light signals shall be clearly visible to motorists, pedestrians, and bicyclists.

If flashing-light signals are in operation at a highway-LRT crossing that is used by pedestrians, bicyclists, and/or other non-motorized road users, an audible device such as a bell shall also be provided and shall be operated in conjunction with the flashing-light signals.

GUIDANCE:

Where the crossing is at a location other than an intersection and LRT speeds exceed 25 mph, flashing-light signals should be installed.

OPTION:

Traffic control signals may be used instead of flashing-light signals at highway-LRT grade crossings within highway-highway intersections where LRT speeds do not exceed 35 mph. Traffic control signals or flashing-light signals may be used where the crossing is at a location other than an intersection, where LRT speeds do not exceed 25 mph, and when the roadway is a low-volume street where prevailing speeds do not exceed 25 mph.

8C.4 Automatic Gates

SUPPORT:

An automatic gate is a traffic control device used in conjunction with flashing-light signals.

STANDARD:

The automatic gate (see Figure 8C-1) shall consist of a drive mechanism and a fully retroreflectorized red- and white-striped gate arm with lights. When in the down position, the gate arm shall extend across the approaching lanes of highway traffic.

In the normal sequence of operation, unless constant warning time detection or other advanced system requires otherwise, the flashing-light signals and the lights on the

gate arm (in its normal upright position) shall be activated immediately upon detection of approaching rail traffic. The gate arm shall start its downward motion not less than 3 seconds after the flashing-light signals start to operate, shall reach its horizontal position at least 5 seconds before the arrival of the rail traffic, and shall remain in the down position as long as the rail traffic occupies the grade crossing.

When the rail traffic clears the grade crossing, and if no other rail traffic is detected, the gate arm shall ascend to its upright position, following which the flashing-light signals and the lights on the gate arm shall cease operation.

Gate arms shall be fully retroreflectorized on both sides, and shall have vertical stripes alternately red and white at 16-inch intervals measured horizontally.

SUPPORT:

It is acceptable to replace a damaged gate with a gate having vertical stripes even if the other existing gates at the same grade crossing have diagonal stripes; however, it is also acceptable to replace a damaged gate with a gate having diagonal stripes if the other existing gates at the same grade crossing have diagonal stripes in order to maintain consistency per the provisions of the last option of the Introduction.

STANDARD:

Gate arms shall have at least three red lights as provided in Figure 8C-1.

When activated, the gate arm light nearest the tip shall be illuminated continuously and the other lights shall flash alternately in unison with the flashing-light signals.

The entrance gate arm mechanism shall be designed to fail safe in the down position.

GUIDANCE:

The gate arm should ascend to its upright position 12 seconds or less.

In its normal upright position, when no rail traffic is approaching or occupying the grade crossing, the gate arm should be either vertical or nearly so (see Figure 8C-1).

In the design of individual installations, consideration should be given to timing the operation of the gate arm to accommodate large and/or slow-moving highway vehicles.

The gates should cover the approaching highway to block all highway vehicles from being driven around the gate without crossing the center line.

If the Dynamic Exit Gate Operating Mode is used, highway vehicle intrusion detection devices that are part of a system that incorporates processing logic to detect the presence of highway vehicles within the minimum track clearance distance should be installed to control exit gate operation.

Regardless of which exit gate operating mode is used, the Exit Gate Clearance Time should be considered when determining additional time requirements for the Minimum Warning Time.

If a Four-Quadrant Gate system is used at a location that is adjacent to an intersection that could cause highway vehicles to queue within the minimum track clearance distance, the Dynamic Exit Gate Operating Mode should be used unless an engineering study indicates otherwise.

If a Four-Quadrant Gate system is interconnected with a highway traffic signal, backup or standby power should be considered for the highway traffic signal. Also, circuitry should be installed to prevent the highway traffic signal from leaving the track clearance green interval until all of the gates are lowered.

At locations where sufficient space is available, exit gates should be positioned downstream from the track a distance that provides a safety zone long enough to accommodate at least one design vehicle between the exit gate and the nearest rail.

Four-Quadrant Gate systems should include remote health (status) monitoring capable of automatically notifying railroad or LRT signal maintenance personnel when anomalies have occurred within the system.

OPTION:

Exit lane gate arms may fail in the down position if the grade crossing is equipped with remote health (status) monitoring.

Four-Quadrant Gate installations may include median islands between opposing lanes on an approach to a grade crossing.

GUIDANCE:

Where sufficient space is available, median islands should be at least 60 feet in length.

8C.7 Wayside Horn Systems

OPTION:

A wayside horn system (see definition in Section 1A.13) may be installed in compliance with 49 CFR Part 222 to

provide audible warning directed toward the road users at a highway-rail or highway-LRT grade crossing or at a pathway grade crossing.

STANDARD:

Wayside horn systems used at grade crossings where the locomotive horn is not sounded shall be equipped and shall operate in compliance with the requirements of Appendix E to 49 CFR Part 222.

GUIDANCE:

The same lateral clearance and roadside safety features should apply to wayside horn systems as described in the Standards contained in Section 8C.1. Wayside horn systems, when mounted on a separate pole assembly, should be installed no closer than 15 feet from the center of the nearest track and should be positioned to not obstruct the motorists' line of sight of the flashing-light signals.

8C.8 Rail Traffic Detection

STANDARD:

The devices employed in active traffic control systems shall be actuated by some form of rail traffic detection.

Rail traffic detection circuits, insofar as practical, shall be designed on the fail-safe principle.

Flashing-light signals shall operate for at least 20 seconds before the arrival of any rail traffic, except as provided in the following option.

OPTION:

On tracks where all rail traffic operates at less than 20 mph and where road users are directed by an authorized person on the ground to not enter the crossing at all times that approaching rail traffic is about to occupy the crossing, a shorter signal operating time for the flashing-light signals may be used.

Additional warning time may be provided when determined by an engineering study.

GUIDANCE:

Where the speeds of different rail traffic on a given track vary considerably under normal operation, special devices or circuits should be installed to provide reasonably uniform notice in advance of all rail traffic movements over the grade crossing. Special control features should be used to eliminate the effects of station stops and switching operations within approach control circuits to prevent excessive activation of the traffic control devices while rail traffic is stopped on or switching upon the approach track control circuits.

8C.9 Traffic Control Signals at or Near Highway-Rail Grade Crossings

OPTION:

Traffic control signals may be used instead of flashing-light signals to control road users at industrial highway-rail grade crossings and other places where train movements are very slow, such as in switching operations.

STANDARD:

The appropriate provisions of Part 4 relating to traffic control signal design, installation and operation shall be applicable where traffic control signals are used to control road users instead of flashing-light signals at highway-rail grade crossings.

Traffic control signals shall not be used instead of flashing-light signals to control road users at a mainline highway-rail grade crossing.

GUIDANCE:

The highway agency with jurisdiction, the regulatory agency with statutory authority, if applicable, and the railroad company should jointly determine the preemption operation at highway-rail grade crossings adjacent to signalized highway intersections.

When a highway-rail grade crossing is equipped with a flashing-light signal system and is located within 200 feet of an intersection or mid-block location controlled by a traffic control signal, the traffic control signal should be provided with preemption in accordance with Section 4D.13.

Coordination with the flashing-light signal system, queue detection, or other alternatives should be considered for traffic control signals located farther than 200 feet from the highway-rail grade crossing. Factors to be considered should include traffic volumes, highway vehicle mix, highway vehicle and train approach speeds, frequency of trains, and queue lengths.

The highway agency or authority with jurisdiction, and the regulatory agency with statutory authority, if applicable, should jointly determine the preemption operation and the timing of traffic control signals interconnected with highway-rail grade crossings adjacent to signalized highway intersections.

SUPPORT:

Section 4D.27 includes a recommendation that traffic control signals that are adjacent to highway-rail grade crossings and that are coordinated with the flashing-light signals or that include railroad preemption features be provided with a back-up power supply.

STANDARD:

Information regarding the type of preemption and any related timing parameters shall be provided to the railroad company so that they can design the appropriate train detection circuitry.

If preemption is provided, the normal sequence of traffic control signal indications shall be preempted upon the approach of trains to avoid entrapment of highway vehicles on the highway-rail grade crossing.

This preemption feature shall have an electrical circuit of the closed-circuit principle, or a supervised communication circuit between the control circuits of the highway-rail grade crossing warning system and the traffic control signal controller. The traffic control signal controller pre-emptor shall be activated via the supervised communication circuit or the electrical circuit that is normally energized by the control circuits of the highway-rail grade crossing warning system. The approach of a train to the highway-rail grade crossing shall de-energize the electrical circuit or activate the supervised communication circuit, which in turn shall activate the traffic control signal controller pre-emptor. This shall establish and maintain the preemption condition during the time the highway-rail grade crossing warning system is activated, except that when crossing gates exist, the preemption condition shall be maintained until the crossing gates are energized to start their upward movement. When multiple or successive preemptions occur, train activation shall receive first priority.

GUIDANCE:

If a highway-rail grade crossing is located within 50 feet (or within 75 feet for a highway that is regularly used by multi-unit highway vehicles) of an intersection controlled by a traffic control signal, the use of pre-signals to control traffic approaching the grade crossing should be considered.

STANDARD:

If used, the pre-signals shall display a steady red signal indication during the track clearance portion of a signal preemption sequence to prohibit additional highway vehicles from crossing the railroad track.

GUIDANCE:

Consideration should be given to using visibility-limited signal faces (see definition in Section 1A.13) at the intersection for the downstream signal faces that control the approach that is equipped with pre-signals.

OPTION:

The pre-signal phase sequencing may be timed with an offset from the downstream signalized intersection such that the railroad track area and the area between the railroad track and the downstream signalized intersection is generally kept clear of stopped highway vehicles.

STANDARD:

If a pre-signal is installed at an interconnected highway-rail grade crossing near a signalized intersection, a STOP HERE ON RED (R10-6) sign shall be installed near the pre-signal or at the stop line if used. If there is a nearby signalized intersection with insufficient clear storage distance for a design vehicle, or the highway-rail grade crossing does not have gates, a No Turn on Red (R10-11, R10-11a, or R10-11b) sign (see Section 2B.53) shall be installed for the approach that crosses the railroad track, if applicable.

OPTION:

At locations where a highway-rail grade crossing is located more than 50 feet (or more than 75 feet for a highway regularly used by multi-unit highway vehicles) from an intersection controlled by a traffic control signal, a pre-signal may be used if an engineering study determines a need.

If highway traffic signals must be located within close proximity to the flashing-light signal system, the highway traffic signals may be mounted on the same overhead structure as the flashing-light signals.

SUPPORT:

Section 4C.10 describes the Intersection Near a Grade Crossing signal warrant that is intended for use at a location where the proximity to the intersection of a grade crossing on an intersection approach controlled by a STOP or YIELD sign is the principal reason to consider installing a traffic control signal.

Section 4D.27 describes additional considerations regarding preemption of traffic control signals at or near highway-rail grade crossings.

8C.10 Traffic Control Signals at or Near Highway-LRT Grade Crossings

SUPPORT:

There are two types of traffic control signals for controlling vehicular and LRT movements at interfaces of the two modes. The first is the standard traffic control signal described in Part 4, which is the focus of this Section. The other type of signal is referred to as an LRT signal and is discussed in Section 8C.11.

STANDARD:

The provisions of Part 4 and Section 8C.09 relating to traffic control signal design, installation, and operation, including interconnection with nearby automatic gates or flashing-light signals, shall be applicable as appropriate where traffic control signals are used at highway- LRT grade crossings.

If traffic control signals are in operation at a crossing that is used by pedestrians, bicyclists, and/or other non-motorized road users, an audible device such as a bell shall also be provided and shall be operated in conjunction with the traffic control signals.

GUIDANCE:

When a highway-LRT grade crossing equipped with a flashing-light signal system is located within 200 feet of an intersection or midblock location controlled by a traffic control signal, the traffic control signal should be provided with preemption in accordance with Section 4D.27.

Coordination with the flashing-light signal system should be considered for traffic control signals located more than 200 feet from the crossing. Factors to be considered should include traffic volumes, highway vehicle mix, highway vehicle and LRT approach speeds, frequency of LRT traffic, and queue lengths.

If the highway traffic signal has emergency-vehicle preemption capability, it should be coordinated with LRT operation.

Where LRT operates in a wide median, highway vehicles crossing the tracks and being controlled by both near and far side traffic signal faces should receive a protected left-turn green phase from the far side signal face to clear highway vehicles from the crossing when LRT equipment is approaching the crossing.

OPTION:

Green indications may be provided during LRT phases for highway vehicle, pedestrian, and bicycle movements that do not conflict with LRT movements.

Traffic control signals may be installed in addition to four-quadrant gate systems and automatic gates at a highway-LRT crossing if the crossing occurs within a highway-highway intersection and if the traffic control signals meet the warrants described in Chapter 4C.

At a location other than an intersection, when LRT speeds are less than 25 mph, traffic control signals alone may be used to control road users at highway-LRT grade crossings only when justified by an engineering study.

Typical circumstances may include:

- A. Geometric conditions preclude the installation of highway-LRT grade crossing warning devices.
- B. LRT vehicles share the same roadway with road users.
- C. Traffic control signals already exist.

SUPPORT:

Section 4D.27 contains information regarding traffic control signals at or near highway-LRT grade crossings that are not equipped with highway-LRT grade crossing warning devices.

Section 4C.10 describes the Intersection Near a Grade Crossing signal warrant that is intended for use at a location where the proximity to the intersection of a grade crossing on an intersection approach controlled by a STOP or YIELD sign is the principal reason to consider installing a traffic control signal.

GUIDANCE:

When a highway-LRT grade crossing exists within a signalized intersection, consideration should be given to providing separate turn signal faces (see definition in Section 1A.13) for the movements crossing the tracks.

STANDARD:

Separate turn signal faces that are provided for turn movements toward the crossing shall display a steady red indication during the approach and/or passage of LRT traffic.

GUIDANCE:

When a signalized intersection that is located within 200 feet of a highway-LRT grade crossing is preempted, all existing turning movements toward the highway-LRT grade crossing should be prohibited.

SUPPORT:

Section 8B.8 contains information regarding the prohibition of turning movements toward the crossing during preemption.

Part 4 contains information regarding signal phasing and timing requirements.

8C.11 Use of Traffic Control Signals for Control of LRT Vehicles at Grade Crossings

GUIDANCE:

LRT movements in semi-exclusive alignments at non-gated grade crossings that are equipped with traffic control signals should be controlled by special LRT signal indications.

LRT traffic control signals, that are used to control LRT movements only, should display the signal indications illustrated in Figure 8C-3.

SUPPORT:

Section 4D.27 contains information about the use of the signal indications shown in Figure 8C-3 for the control of exclusive bus movements at "queue jumper lanes" and for the control of exclusive bus rapid transit movements on semi-exclusive or mixed-use alignments.

OPTION:

Standard traffic control signals may be used instead of LRT traffic control signals to control the movement of LRT vehicles (see Section 8C.10).

STANDARD:

If a separate set of standard traffic control signal indications (red, yellow, and green circular and arrow indications) is used to control LRT movements, the indications shall be positioned so they are not visible to motorists, pedestrians, and bicyclists (see Section 4D.12).

If the LRT crossing control is separate from the intersection control, the two shall be interconnected. The LRT signal phase shall not be terminated until after the LRT vehicle has cleared the crossing.

OPTION:

LRT signals may be used at grade crossings and at intersections in mixed-use alignments in conjunction with standard traffic control signals where special LRT signal phases are used to accommodate turning LRT vehicles or where additional LRT clearance time is desirable.

GUIDANCE:

LRT signal faces should be separated vertically or horizontally from the nearest highway traffic signal face for the same approach by at least 3 feet.

Part 9. TRAFFIC CONTROLS FOR BICYCLE FACILITIES

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Part 9. TRAFFIC CONTROLS FOR BICYCLE FACILITIES

Chapter 9B. Signs

9B.1 Application and Placement of Signs

STANDARD:

Bicycle signs shall be standard in shape, legend, and color.

All signs shall be retroreflectORIZED for use on bikeways, including shared-use paths and bicycle lane facilities.

Where signs serve both bicyclists and other road users, vertical mounting height and lateral placement shall be as provided in Part 2.

Where used on a shared-use path, no portion of a sign or its support shall be placed less than 2 feet laterally from the near edge of the path, or less than 8 feet vertically over the entire width of the shared-use path (see Figure 9B-1).

Mounting height for post-mounted signs on shared-use paths shall be a minimum of 4 feet measured vertically from the bottom of the sign to the elevation of the near edge of the path surface (see Figure 9B-1).

GUIDANCE:

Signs for the exclusive use of bicyclists should be located so that other road users are not confused by them.

The clearance for overhead signs on shared-use paths should be adjusted when appropriate to accommodate path users requiring more clearance, such as equestrians, or typical maintenance or emergency vehicles.

9B.2 Design of Bicycle Signs

STANDARD:

If the sign or plaque applies to motorists and bicyclists, then the size shall be as shown for conventional roads in in Tables 2B-1, 2C-2, 2D-1 , or Appendix C at the back of this Manual.

The minimum sign and plaque sizes for shared-use paths shall be those shown in Table 9B-1 and in Appendix C at the back of this Manual, and shall be used only for signs and plaques installed specifically for bicycle traffic applications. The minimum sign and plaque sizes for bicycle facilities shall not be used for signs or plaques that are placed in a location that would have any application to other vehicles.

OPTION:

Larger size signs and plaques may be used on bicycle facilities when appropriate (see Section 2A.11).

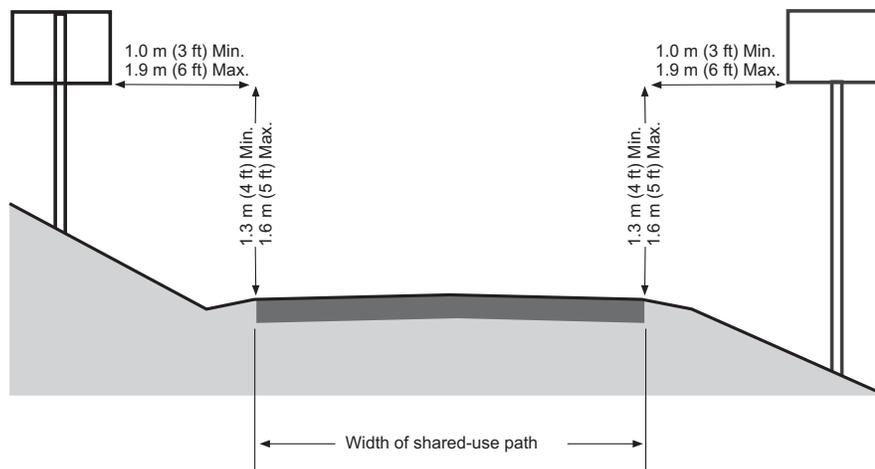


Figure 9B-1 Sign Placement on Shared-Use Paths

Sign or Plaque	Sign Designation	Section	Shared-Use Path	Roadway
Stop	R1-1	2B.5, 9B.3	18 x 18	30 x 30
Yield	R1-2	2B.8, 9B.3	18 x 18 x 18	30 x 30 x 30
Bike Lane	R3-17	9B.4	---	24 x 18
Bike Lane (plaques)	R3-17aP, R3-17bP	9B.4	---	24 x 8
Movement Restriction	R4-1,2,3,7,16	2B.28, 29, 30, 32, 9B.14	12 x 18	18 x 24
Begin Right Turn Lane Yield to Bikes	R4-4	9B.5	---	36 x 30
Bicycles May Use Full Lane	R4-11	9B.6	---	30 x 30
Bicycle Wrong Way	R5-1b	9B.7	12 x 18	12 x 18
No Motor Vehicles	R5-3	9B.8	24 x 24	24 x 24
No Bicycles	R5-6	9B.9	18 x 18	24 x 24
No Parking Bike Lane	R7-9,9a	9B.10	---	12 x 18
No Pedestrians	R9-3	9B.9	18 x 18	18 x 18
Ride With Traffic (plaque)	R9-3cP	9B.7	12 x 12	12 x 12
Bicycle Regulatory	R9-5,6	9B.11	12 x 18	12 x 18
Shared-Use Path Restriction	R9-7	9B.12	12 x 18	---
No Skaters	R9-13	9B.9	18 x 18	18 x 18
No Equestrians	R9-14	9B.9	18 x 18	18 x 18
Bicycle Regulatory	R9-X1,X2	9B.11	12 x 18	12 x 18
Push Button for Green Light	R10-4	9B.11	9 x 12	9 x 12
To Request Green Wait on Symbol	R10-22	9B.13	12 x 18	12 x 18
Bike Push Button for Green Light	R10-24	9B.11	9 x 15	9 x 15
Push Button to Turn on Warning Lights	R10-25	9B.11	9 x 12	9 x 12
Bike Push Button for Green Light (arrow)	R10-26	9B.11	9 x 15	9 x 15
Grade Crossing (Crossbuck)	R15-1	8B.3, 9B.14	24 x 4.5	48 x 9
Number of Tracks (plaque)	R15-2P	8B.3, 9B.14	13.5 x 9	27 x 18
Look	R15-8	8B.17, 9B.14	18 x 9	36 x 18
Horizontal Alignment	W1-1,2,3,4,5	2C.4, 9B.15	18 x 18	24 x 24
Arrow Warning	W1-6,7	2C.12, 2C.47, 9B.15	24 x 12	36 x 18
Intersection Warning	W2-1,2,3,4,5	2C.46, 9B.16	18 x 18	24 x 24
Stop, Yield, Signal Ahead	W3-1,2,3	2C.36, 9B.19	18 x 18	30 x 30
Narrow Bridge	W5-2	2C.20, 9B.19	18 x 18	30 x 30
Path Narrows	W5-4a	9B.19	18 x 18	---
Hill	W7-5	9B.19	18 x 18	30 x 30
Bump or Dip	W8-1,2	2C.28, 9B.17	18 x 18	24 x 24
Pavement Ends	W8-3	2C.30, 9B.17	18 x 18	30 x 30
Bicycle Surface Condition	W8-10	9B.17	18 x 18	30x x30
Slippery When Wet (plaque)	W8-10P	9B.17	12 x 9	12 x 9
Grade Crossing Advance Warning	W10-1	8B.6, 9B.19	24 Dia.	36 Dia.
No Train Horn (plaque)	W10-9P	8B.21, 9B.19	18 x 12	30 x 24
Skewed Crossing	W10-12	8B.25, 9B.19	18 x 18	36 x 36
Bicycle Warning	W11-1	9B.18	18 x 18	24 x 24
Pedestrian Crossing	W11-2	2C.50, 9B.19	18 x 18	24 x 24
Combination Bike and Ped Crossing	W11-15	9B.18	18 x 18	30 x 30
Trail Crossing (plaque)	W11-15P	9B.18	18 x 12	24 x 18
Low Clearance	W12-2	2C.27, 9B.19	18 x 18	30 x 30
Playground	W15-1	2C.51, 9B.19	18 x 18	24 x 24

Table 9B-1 Bicycle facility Sign and Plaque Minimum Sizes (sheet 1 of 2)

Sign or Plaque	Sign Designation	Section	Shared-Use Path	Roadway
Share the Road (plaque)	W16-1P	2C.60, 9B.19	---	18 x 24
XX Feet (plaque)	W16-2P	2C.55, 9B.18	18 x 12	24 x 18
XX Ft (plaque)	W16-2aP	2C56, 9B.18	18 x 9	24 x 12
Diagonal Arrow (plaque)	W16-7P	9B.18	---	24 x 12
Ahead (plaque)	W16-9P	9B.18	---	24 x 12
Destination (1 line)	D1-1, D1-1a	2D.37, 9B.20	varies x 6	varies x 18
Bicycle Destination (1 line)	D1-1b, D1-1c	9B.20	varies x 6	varies x 6
Destination (2 lines)	D1-2, D1-2a	2D.37, 9B.20	varies x 12	varies x 30
Bicycle Destination (2 lines)	D1-2b, D1-2c	9B.20	varies x 12	varies x 12
Destination (3 lines)	D1-3, D1-3a	2D.37, 9B.20	varies x 18	varies x 42
Bicycle Destination (3 lines)	D1-3b, D1-3c	9B.20	varies x 18	varies x 18
Street Name	D3-1	2D.43, 9B.20	varies x 6	varies x 8
Bicycle Parking Area	D4-3	9B.23	12 x 18	12 x 18
Reference Location (1-digit)	D10-1	2H.5, 9B.24	6 x 12	10 x 18
Intermediate Reference Location (2-digits)	D10-1a	2H.5, 9B.24	6 x 18	10 x 27
Reference Location (2-digits)	D10-2	2H.5, 9B.24	6 x 18	10 x 27
Intermediate Reference Location (3-digits)	D10-2a	2H.5, 9B.24	6 x 24	10 x 36
Reference Location (3-digits)	D10-3	2H.5, 9B.24	6 x 24	10 x 36
Intermediate Reference Location (4-digits)	D10-3a	2H.5, 9B.24	6 x 30	10 x 48
Bike Route	D11-1, D11-1c	9B.20	24 x 18	24 x 18
Bicycles Permitted	D11-1a	9B.25	18 x 18	---
Bike Route (plaque)	D11-1bP	9B.25	18 x 6	---
Pedestrians Permitted	D11-2	9B.25	18 x 18	---
Skaters Permitted	D11-3	9B.25	18 x 18	---
Equestrians Permitted	D11-4	9B.25	18 x 18	---
Bicycle Route	M1-8, M1-8a	9B.21	12 x 18	18 x 24
U.S. Bicycle Route	M1-9	9B.21	12 x 18	18 x 24
Bicycle Route Auxiliary Signs	M2-1; M3-1,2,3,4; M4-1,1a,2,3,5,6,7,7a,8,14	9B.22	12 x 6	12 x 6
Bicycle Route Arrow Signs	M5-1,2; M6-1,2,3,4,5,6,7	9B.22	12 x 9	12 x 9
Type 3 Object Markers	OM3-L,C,R	2C.63, 9B.26	6 x 18	12 x 36

- Notes: 1. Larger signs may be used when appropriate.
2. Dimensions are shown in inches and are shown as width x height.

Table 9B-1 Bicycle Facility Sign and Plaque Minimum Sizes (sheet 2 of 2)

GUIDANCE:

Except for size, the design of signs and plaques for bicycle facilities should be identical to that provided in this Manual for signs and plaques for streets and highways.

SUPPORT:

Uniformity in design of bicycle signs and plaques includes shape, color, symbols, arrows, wording, lettering, and illumination or retroreflectorization.

9B.3 STOP and YIELD Signs (R1-1, R1-2)



R1-1



R1-2

STANDARD:

STOP (R1-1) signs shall be installed on shared-use paths at points where bicyclists are required to stop.

YIELD (R1-2) signs shall be installed on shared-use paths at points where bicyclists have an adequate view of conflicting traffic as they approach the sign, and where bicyclists are required to yield the right-of-way to that conflicting traffic.

OPTION:

A 30 x 30 inch STOP sign or a 36 x 36 x 36 inch YIELD sign may be used on shared-use paths for added emphasis.

GUIDANCE:

Where conditions require path users, but not roadway users, to stop or yield, the STOP or YIELD sign should be placed or shielded so that it is not readily visible to roadway users.

When placement of STOP or YIELD signs is considered, priority at a shared-use path/roadway intersection should be assigned with consideration of the following:

- A. Relative speeds of shared-use path and roadway users;
- B. Relative volumes of shared-use path and roadway traffic; and
- C. Relative importance of shared-use path and roadway.

Speed should not be the sole factor used to determine priority, as it is sometimes appropriate to give priority to a high-volume shared-use path crossing a low-volume street, or to a regional shared-use path crossing a minor collector street.

When priority is assigned, the least restrictive control that is appropriate should be placed on the lower priority approaches. STOP signs should not be used where YIELD signs would be acceptable.

9B.4 Bike Lane Signs and Plaques (R3-17, R3-17aP, R3-17bP)



R3-17



R3-17aP



R3-17bP

STANDARD:

The BIKE LANE (R3-17) sign and the R3-17aP and R3-17bP plaques (see Figure 9B-2) shall be used only in conjunction with marked bicycle lanes as described in Section 9C.4

GUIDANCE:

If used, Bike Lane signs and plaques should be used in advance of the upstream end of the bicycle lane, at the downstream end of the bicycle lane, and at periodic intervals along the bicycle lane as determined by engineering judgment based on prevailing speed of bicycle and other traffic, block length, distances from adjacent intersections, and other considerations.

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**9B.5 BEGIN RIGHT TURN LANE
YIELD TO BIKES Sign (R4-4)**



R4-4

OPTION:

Where motor vehicles entering an exclusive right-turn lane must weave across bicycle traffic in bicycle lanes, the BEGIN RIGHT TURN LANE YIELD TO BIKES (R4-4) sign may be used to inform both the motorist and the bicyclist of this weaving maneuver (see Figures 9C-1, 9C-4, and 9C-5).

GUIDANCE:

The R4-4 sign should not be used when bicyclists need to move left because of a right-turn lane drop situation.

**9B.6 Bicycles May Use Full Lane Sign
(R4-11)**



R4-11

OPTION:

The Bicycles May Use Full Lane (R4-11) sign (see Figure 9B-2) may be used on roadways where no bicycle lanes or adjacent shoulders usable by bicyclists are present and where travel lanes are too narrow for bicyclists and motor vehicles to operate side by side.

The Bicycles May Use Full Lane sign may be used in locations where it is important to inform road users that bicyclists might occupy the travel lane.

Section 9C.7 describes a Shared Lane Marking that may be used in addition to or instead of the Bicycles May Use Full Lane sign to inform road users that bicyclists might occupy the travel lane.

SUPPORT:

The Uniform Vehicle Code (UVC) defines a "substandard width lane" as a "lane that is too narrow for a bicycle and a vehicle to travel safely side by side within the same lane."

**9B.7 Bicycle WRONG WAY Sign and
RIDE WITH TRAFFIC Plaque
(R5-1b, R9-3cP)**



R5-1b



R9-3cP

OPTION:

The Bicycle WRONG WAY (R5-1b) sign and RIDE WITH TRAFFIC (R9-3c) plaque may be placed facing wrong-way bicycle traffic, such as on the left side of a roadway.

This sign and plaque may be mounted back-to-back with other signs to minimize visibility to other traffic.

STANDARD:

If used, the RIDE WITH TRAFFIC plaque shall be used only in conjunction with the Bicycle WRONG WAY sign, and be mounted directly below the Bicycle WRONG WAY sign.

9B.8 NO MOTOR VEHICLES Sign (R5-3)



R5-3

OPTION:

The NO MOTOR VEHICLES (R5-3) sign may be installed at the entrance to a shared-use path.

9B.9 Selective Exclusion Signs

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R5-6



R9-3



R9-13



R9-14

OPTION:

Selective Exclusion signs may be installed at the entrance to a roadway or facility to notify road or facility users that designated types of traffic are excluded from using the roadway or facility.

STANDARD:

If used, Selective Exclusion signs shall clearly indicate the type of traffic that is excluded.

SUPPORT:

Typical exclusion messages include:

- A. No Bicycles (R5-6),
- B. No Pedestrians (R9-3),
- C. No Skaters (R9-13), and
- D. No Equestrians (R9-14).

OPTION:

Where bicyclists, pedestrians, and motor-driven cycles are all prohibited, it may be more desirable to use the R5-10a word message sign that is described in Section 2B.39.

9B.10 No Parking Bike Lane Signs (R7-9, R7-9a)



R7-9



R7-9a

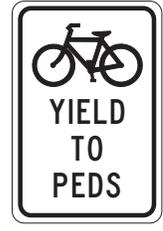
STANDARD:

If the installation of signs is necessary to restrict parking, standing, or stopping in a bicycle lane, appropriate signs as described in Sections 2B.39 through 2B.41, or the No Parking Bike Lane (R7-9 or R7-9a) signs shall be installed.

9B.11 Bicycle Regulatory Signs (R9-5, R9-6, R10-4, R10-24, R10-25, and R10-26)



R9-5



R9-6



R10-4



R10-24



R10-25



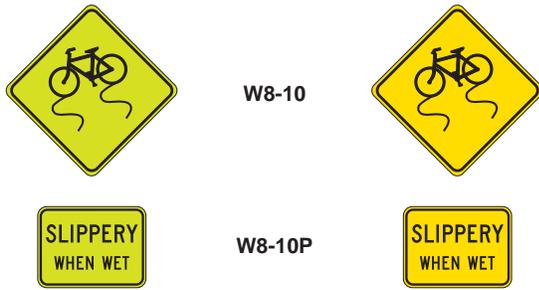
R10-26

OPTION:

The R9-5 sign may be used where the crossing of a street by bicyclists is controlled by pedestrian signal indications.

Where it is not intended for bicyclists to be controlled by pedestrian signal indications, the R10-4, R10-24, or R10-26 sign (see Section 2B.52) may be used.

9B.17 Bicycle Surface Condition Warning Sign (W8-10)



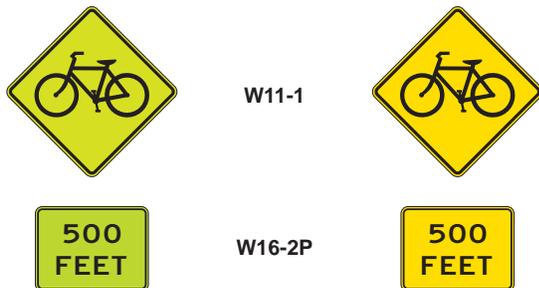
OPTION:

The Bicycle Surface Condition Warning (W8-10) sign may be installed where roadway or shared-use path conditions could cause a bicyclist to lose control of the bicycle.

Signs warning of other surface conditions that might be of concern to bicyclists including BUMP (W8-1), DIP (W8-2), PAVEMENT ENDS (W8-3), and any other word message that describes conditions that are of concern to bicyclists, may also be used.

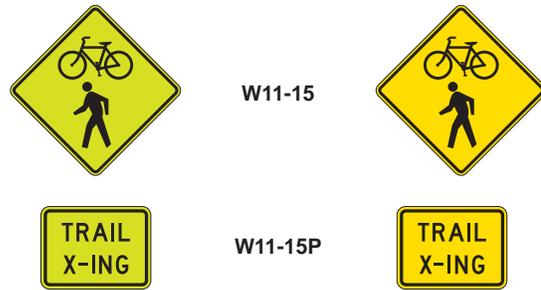
A supplemental plaque may be used to clarify the specific type of surface condition.

9B.18 Bicycle Warning and Combined Bicycle/Pedestrian Signs (W11-1 and W11-15)



SUPPORT:

The Bicycle Warning (W11-1) sign alerts the road user to unexpected entries into the roadway by bicyclists, and other crossing activities that might cause conflicts. These conflicts might be relatively confined, or might occur randomly over a segment of roadway.



OPTION:

The combined Bicycle/Pedestrian (W11-15) sign may be used where both bicyclists and pedestrians might be crossing the roadway, such as at an intersection with a shared-use path. A TRAIL X-ING (W11-15P) supplemental plaque may be mounted below the W11-15 sign.

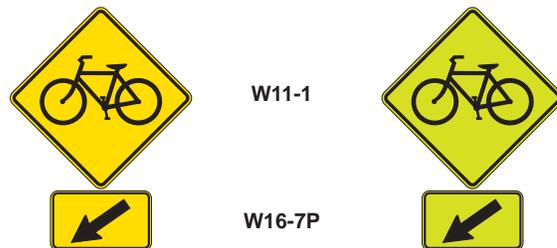
A supplemental plaque with the legend AHEAD or XXX FEET may be used with the Bicycle Warning or combined Bicycle/Pedestrian sign.

GUIDANCE:

If used in advance of a specific crossing point, the Bicycle Warning or combined Bicycle/Pedestrian sign should be placed at a distance in advance of the crossing location that conforms with the guidance given in Table 2C-4.

STANDARD:

Bicycle Warning signs, when used at the location of the crossing, shall be supplemented with a diagonal downward pointing arrow (W16-7P) plaque to show the location of the crossing.



OPTION:

A fluorescent yellow-green background color with a black legend and border may be used for Bicycle Warning and combined Bicycle/Pedestrian signs and supplemental plaques.

GUIDANCE:

When the fluorescent yellow-green background color is used, a systematic approach featuring one background color within a zone or area should be used. The mixing of standard yellow and fluorescent yellow-green backgrounds within a zone or area should be avoided.

9B.19 Other Bicycle Warning Signs



W3-1



W3-2



W3-3



W5-2



W5-4a



W7-5



W8-1



W8-2



W10-1



W11-2



W12-2



W15-1

OPTION:

Other bicycle warning signs such as PATH NARROWS (W5-4a) and Hill (W7-5) may be installed on shared-use paths to warn bicyclists of conditions not readily apparent.

In situations where there is a need to warn motorists to watch for bicyclists traveling along the highway, the SHARE THE ROAD (W16-1P) plaque may be used in conjunction with the W11-1 sign.



W11-1



W16-1P



GUIDANCE:

If used, other advance bicycle warning signs should be installed at least 50 feet in advance of the beginning of the condition.

Where temporary traffic control zones are present on bikeways, appropriate signs from Part 6 should be used.

OPTION:

Other warning signs described in Chapter 2C may be installed on bicycle facilities as appropriate.

9B.20 Bicycle Guide Signs

(D1-1b, D1-1c, D1-2b, D1-2c,
D1-3b, D1-3c, D11-1, D11-1c)

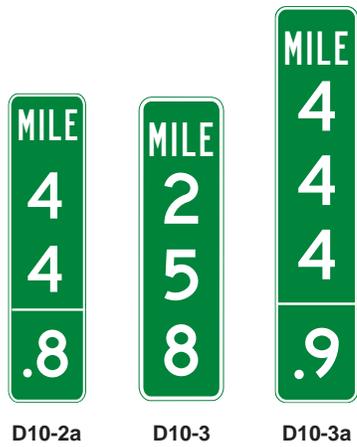


D11-1

OPTION:

Bike Route Guide (D11-1) signs may be provided along designated bicycle routes to inform bicyclists of bicycle route direction changes and to confirm route direction, distance, and destination.

If used, Bike Route Guide signs may be repeated at regular intervals so that bicyclists entering from side streets will have an opportunity to know that they are on a bicycle route. Similar guide signing may be used for shared roadways with intermediate signs placed for bicyclist guidance.



OPTION:

Reference Location (D10-1 to D10-3) signs may be installed along any section of a shared-use path to assist users in estimating their progress, to provide a means for identifying the location of emergency incidents and crashes, and to aid in maintenance and servicing.

To augment the reference location sign system, Intermediate Reference Location (D10-1a to D10-3a) signs, which show the tenth of a mile with a decimal point, may be installed at one tenth of a mile intervals, or at some other regular spacing.

STANDARD:

If Intermediate Reference Location (D10-1a to D10-3a) signs are used to augment the reference location sign system, the reference location sign at the integer mile point shall display a decimal point and a zero numeral.

If placed on shared-use paths, reference location signs shall contain 4.5-inch white numerals on a green background that is at least 6 inches wide with a white border. The signs shall contain the word MILE in 2.25-inch white letters.

Reference location signs shall have a minimum mounting height of 2 feet, measured vertically from the bottom of the sign to the elevation of the near edge of the shared-use path, and shall not be governed by the mounting height requirements prescribed in Section 9B.1.

OPTION:

Reference location signs may be installed on one side of the shared-use path only and may be installed back-to-back.

If a reference location sign cannot be installed in the correct location, it may be moved in either direction as much as 50 feet.

GUIDANCE:

If a reference location sign cannot be placed within 50 feet of the correct location, it should be omitted. Zero distance should begin at the south and west terminus points of shared-use paths.

SUPPORT:

Section 2H.5 contains additional information regarding reference location signs.

9B.25 Mode-Specific Guide Signs for Shared-Use Paths (D11-1a, D11-2, D11-3, D11-4)



OPTION:

Where separate pathways are provided for different types of users, Mode-Specific Guide (D11-1a, D11-2, D11-3, D11-4) signs may be used to guide different types of users to the traveled way that is intended for their respective modes.

Mode-Specific Guide signs may be installed at the entrance to shared-use paths where the signed mode(s) are permitted or encouraged, and periodically along these facilities as needed.

The Bicycles Permitted (D11-1a) sign, when combined with the BIKE ROUTE supplemental plaque (D11-1bP), may be substituted for the D11-1 Bicycle Route Guide sign on paths and shared roadways.

When some, but not all, non-motorized user types are encouraged or permitted on a shared-use path, Mode-Specific Guide signs may be placed in combination with each other, and in combination with signs (see Section 9B.9) that prohibit travel by particular modes.

SUPPORT:

Figure 9B-8 shows an example of signing where separate pathways are provided for different non-motorized user types.

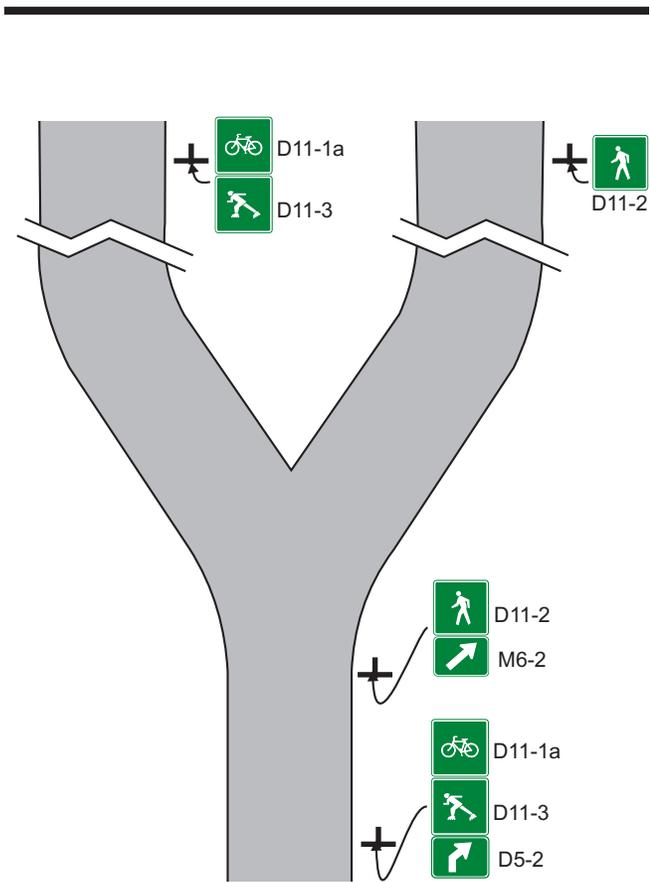
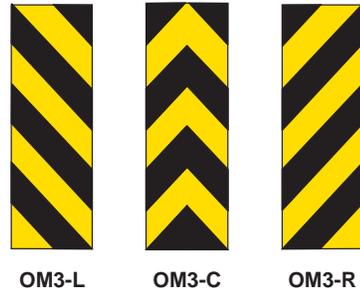


Figure 9B-8 Examples of Mode-Specific Guide Signing on a Shared-Use Path

9B.26 Object Markers



OPTION:

Fixed objects adjacent to shared-use paths may be marked with Type 1, Type 2, or Type 3 object markers such as those described in Section 2C.63. If the object marker is not intended to also be seen by motorists, a smaller version of the Type 3 object marker may be used (see Table 9B-1).

STANDARD:

Obstructions in the traveled way of a shared-use path shall be marked with retroreflectorized material or appropriate object markers.

All object markers shall be retroreflective.

On Type 3 object markers, the alternating black and retroreflective yellow stripes shall be sloped down at an angle of 45 degrees toward the side on which traffic is to pass the obstruction.

Part 9. TRAFFIC CONTROLS FOR BICYCLE FACILITIES

Chapter 9C. Markings

9C.1 Functions of Markings

SUPPORT:

Markings indicate the separation of the lanes for road users, assist the bicyclist by indicating assigned travel paths, indicate correct position for traffic signal actuation, and provide advance information for turning and crossing maneuvers.

9C.2 General Principles

GUIDANCE:

Bikeway design guides (see Section 9A.5) should be used when designing markings for bicycle facilities.

STANDARD:

Markings used on bikeways shall be retroreflectorized.

GUIDANCE:

Pavement marking word messages, symbols, and/or arrows should be used in bikeways where appropriate. Consideration should be given to selecting pavement marking materials that will minimize loss of traction for bicycles under wet conditions.

STANDARD:

The colors, width of lines, patterns of lines, symbols, and arrows used for marking bicycle facilities shall be as defined in Sections 3A.5, 3A.6, and 3B.20.

SUPPORT:

Figures 9B-7 and 9C-1 through 9C-9 show examples of the application of lines, word messages, symbols, and arrows on designated bikeways.

OPTION:

A dotted line may be used to define a specific path for a bicyclist crossing an intersection (see Figure 9C-1) as described in Sections 3A.5 and 3B.8.

9C.3 Marking Patterns and Colors on Shared-Use Paths

OPTION:

Where shared-use paths are of sufficient width to designate two minimum width lanes, a solid yellow line may be used to separate the two directions of travel where passing is not permitted, and a broken yellow line may be used where passing is permitted (see Figure 9C-2).

GUIDANCE:

Broken lines used on shared-use paths should have the usual 1-to-3 segment-to-gap ratio. A nominal 3-foot segment with a 9-foot gap should be used.

If conditions make it desirable to separate two directions of travel on shared-use paths at particular locations, a solid yellow line should be used to indicate no passing and no traveling to the left of the line.

Markings as shown in Figure 9C-8 should be used at the location of obstructions in the center of the path, including vertical elements intended to physically prevent unauthorized motor vehicles from entering the path.

OPTION:

A solid white line may be used on shared-use paths to separate different types of users. The R9-7 sign (see Section 9B.12) may be used to supplement the solid white line.

Smaller size letters and symbols may be used on shared-use paths. Where arrows are needed on shared use paths, half-size layouts of the arrows may be used (see Section 3B.20).

9C.4 Markings For Bicycle Lanes

SUPPORT:

Pavement markings designate that portion of the roadway for preferential use by bicyclists. Markings inform all road users of the restricted nature of the bicycle lane.

Examples of bicycle lane markings at right-turn lanes are shown in Figures 9C-1, 9C-3, and 9C-4. Examples of pavement markings for bicycle lanes on a two-way street are shown in Figure 9C-5. Pavement symbols and markings for bicycle lanes are shown in Figure 9C-6.

STANDARD:

Longitudinal pavement markings shall be used to define bicycle lanes.

GUIDANCE:

If used, bicycle lane word, symbol, and/or arrow markings (see Figure 9C-3) should be placed at the beginning of a bicycle lane and at periodic intervals along the bicycle lane based on engineering judgment.

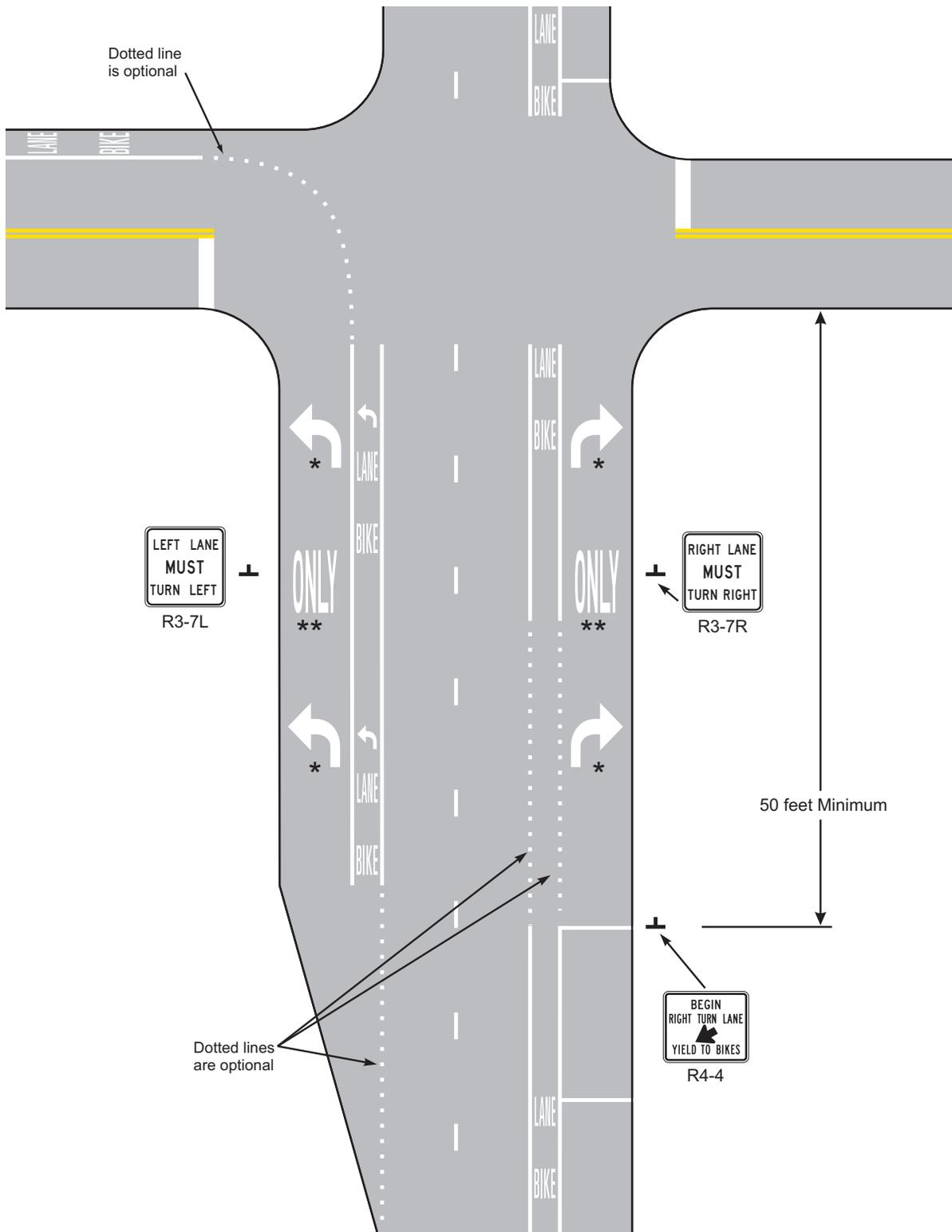


Figure 9C-1 Example of Intersection Pavement Markings-Designated Bicycle Lane with Left-Turn Area, Heavy Turn Volumes, Parking, One-Way Traffic, or Divided Highway

Appendix A2 METRIC CONVERSION

Throughout this Manual all dimensions and distances are provided in English units. Tables A2-1 through A2-4 show the equivalent Metric (International System of Units) value for each of the English unit numerical values that are used in this Manual.

Table A2-1. Conversion of Inches to Millimeters

Inches	Millimeters	Inches	Millimeters	Inches	Millimeters	Inches	Millimeters
0.25	6	3.5	87	12	300	36	900
0.4	10	4	100	15	375	42	1050
0.5	13	4.5	113	16	400	48	1200
0.75	19	5	125	18	450	54	1350
1	25	6	150	21	525	60	1500
1.25	31	8	200	24	600	72	1800
2	50	9	225	27	675	84	2100
2.25	56	10	250	28	700	120	3000
2.5	62	10.4	260	30	750		
3	75	10.5	265	32	800		

Note: 1 inch = 25.4 millimeters; 1 millimeter = 0.039 inches

Table A2-2. Conversion of Feet to Meters

Feet	Meters	Feet	Meters	Feet	Meters	Feet	Meters
1	0.3	11	3.4	40	12	200	60
2	0.6	12	3.7	50	15	250	75
2.5	0.75	12.75	3.9	53	16	300	90
3	0.9	14	4.3	60	18	330-	100
3.25	1	15	4.6	70	21	400	120
3.5	1.1	16	4.9	72	22	500	150
4	1.1	17	5.2	75	23	530	160
4.5	1.4	18	5.	80	24	600	180
4.75	1.45	19	5.8	90	27	650	200
5	1.5	20	6.1	95	29	700	210
5.67	1.7	22	6.7	100	30	750	230
6	1.8	23.5	7.2	110	34	800	245
7	2.1	26	7.6	120	37	1,000	300
8	2.4	25.6	7.8	125	38	1,500	450
9	2.7	30	9	130	40	2,000	600
9.25	2.8	32	9.8	140	43	2,300	700
9.5	2.9	33	10	150	46	3,000	900
10	3	36	11	180	55		

Note: 1 foot = 0.3048 meters; 1 meter = 3.28 feet

Table A2-3. Conversion of Miles to Kilometers

Miles	Kilometers	Miles	Kilometers	Miles	Kilometers	Miles	Kilometers
0.25	0.4	1	1.6	5	8	70	110
0.5	0.8	2	3.2	10	16		
0.6	1	3	4.8	15	25		

Note: 1 mile = 1.609 kilometers; 1 kilometer = 0.621 miles

Table A2-4. Conversion of Miles per Hour to Kilometers/Hour

mph	km/h	mph	km/h	mph	km/h	mph	km/h
3	5	25	40	45	70	65	105
10	16	30	50	50	80	70	110
15	20	35	60	55	90	80	130
20	30	40	60	60	100		

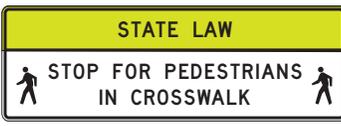
Note: 1 mile per hour = 1.609 kilometers/hour; 1 kilometer/hour = 0.621 miles per hour

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R1-1		White on Red	18 x 18 30 x 30 36 x 36 48 x 48	B-Path B/Rt, CR-SL, M CR-ML, E O	9B.3 2B.5,5B.2,6F.6, 8B.4,8B.5,9B.3 2B.5,5B.2,8B.4 2B.5,5B.2,8B.4
R1-2		White on Red	18 30 36 48 60	B-Path B/RT, M CR-SL, CR-ML, E F	9B.3 2B.8,5B.2,6E.6, 8B.4,8B.5,9B.3, 2B.8,5B.2,6E.3, 8B.4 2B.8,8B.1, 2B.810C.
R1-2aP		Black on White	24 x 18 36 x 30 48 x 36	CR-SL, CR-ML, M E F	2B.10,6E.6 2B.10,6E.6 2B.10,6E.6
R1-3P		White on Red	18 x 6 30 x 12	CR-SL, CR-ML O	2B.5 2B.5
R1-5b		Black and Red on White	36 x 36	CR-ML, O	2B.11
R1-5c		Black and Red on White	36 x 36 36 x 48	CR-ML O	2B.11 2B.11
R1-6a		Black on White and Fluorescent Yellow-Green	12 x 36 (post mounted) 12 x 44 (w/mounting flange)	CR-SL, CR-ML	2B.12, 7B.11,7B.12 2B.12, 7B.11,7B.12
R1-6b		Black on White and Fluorescent Yellow-Green	12 x 36 (post mounted) 12 x 44 (w/mounting flange)	CR-SL, CR-ML	2B.12, 7B.11,7B.12 2B.12, 7B.11,7B.12

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Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R1-6c		Black on White and Fluorescent Yellow-Green	12 x 36	CR-SL, CR-ML	7B.12
			(post mounted) 12 x 44 (w/mounting flange)	CR-SL, CR-ML	7B.12
R1-9a		Black on White and Fluorescent Yellow-Green	90 x 24	CR-SL, CR-ML	2B.12
R1-9b		Black on White and Fluorescent Yellow-Green	90 x 30	CR-SL, CR-ML	2B.12
R1-10P		Black on White	24 x 18	CR-SL, CR-ML	2B.5
R2-1		Black on White	18 x 24	M	2B.13,6H.4
			24 x 30	CR-SL	2B.13,5B.3, 6F.12,6H.4,7B.15
			30 x 36	CR-ML	2B.13.6H.4
			36 x 48	E	2B.13,5B.3, 6F.12,6H.4,7B.15
			48 x 60	F	2B.13,6H.4
R2-2P		Black on White	24 x 24 36 x 36 48 x 48	CR-SL,CR-ML E, O F	2B.14 2B.14 2B.14
R2-3P		Black on White	24 x 24 36 x 36 48 x 48	CR-SL,CR-ML E, O F	2B.15 2B.15 2B.15

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R2-4P		Black on White	24 x 30 36 x 48 48 x 60	CR-SL, CR-ML E, O F	2B.16 2B.16 2B.16
R2-4b		Black on White	24 x 48 36 x 72 48 x 96	CR-SL, CR-ML E, O F	2B.16 2B.16 2B.16
R2-6P		Black on White	24 x 18 36 x 24	CR-SL, CR-ML E, F	2B.17,6F.12,7B.10 2B.17,6F.12,7B.10
R2-6aP		Black on White	24 x 18 36 x 24	CR-SL, CR-ML E, F	6F.12,6H.4,7B.10 6F.12,6H.4,7B.10
R2-6b		Black on White	24 x 30	CR-SL, CR-ML	2B.16.1
R2-6bP		Black on White	24 x 18 36 x 24	CR-SL, CR-ML E, F	6F.12,7B.10 6F.12,7B.10
R2-6c		Black on White	24 x 30	CR-SL, CR-ML E, F	2B.16.2 2B.16.2
R2-10		Black on White	24 x 30 36 x 48 48 x 60	CR-SL, CR-ML E, O F	2B.17,6F.12, 7B.10 2B.17,6F.12, 7B.10 2B.17
R2-11		Black on White	24 x 30 36 x 48 48 x 60	CR-SL, CR-ML E, O F	2B.17,6F.12, 7B.10 2B.17,6F.12, 7B.10 2B.17

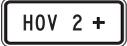
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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R2-12		Black on White	24 x 36 36 x 54	CR-SL, CR-ML E, F	6F.12 6F.12
R2-X5		Black on White	24 x 36	CR-SL, CR-ML	2B.13.1
R3-1		Black and Red on White	24 x 24 36 x 36 48 x 48	CR-SL ,CR-ML, E O	2B.18,6F.6 2B.18,6F.6 2B.18,6F.6
R3-1a		White on Black	24 x 30 30 x 36	CR-SL ,CR-ML	8B.8 8B.8
R3-2		Black and Red on White	24 x 24 36 x 36 48 x 48	CR-SL ,CR-ML, E O	2B.18,6F.6 2B.18,6F.6 2B.18,6F.6
R3-2a		White on Black	24 x 30 30 x 36	CR-SL ,CR-ML	8B.8 8B.8
R3-3		Black on White	24 x 24 36 x 36 48 x 48	CR-SL ,CR-ML, E O	2B.18,6F.6 2B.18,6F.6 2B.18,6F.6
R3-4		Black and Red on White	24 x 24 36 x 36 48 x 48	CR-SL ,CR-ML, E O	2B.18,6F.6 2B.18,6F.6 2B.18,6F.6
R3-5 (R or L)		Black on White	30 x 36	CR-SL, ,CR-ML	2B.20,6F.6

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R3-5a		Black on White	30 x 36	CR-SL, CR-ML	2B.20
R3-5bP		Black on White	30 x 12	CR-SL, CR-ML	2B.20
R3-5cP		Black on White	24 x 12	CR-SL, CR-ML	2B.20
R3-5dP		Black on White	30 x 12	CR-SL, CR-ML	2B.20
R3-5eP		Black on White	30 x 12	CR-SL, CR-ML	2B.20
R3-5fP		Black on White	30 x 12	CR-SL, CR-ML	2B.20
R3-5gP		Black on White	30 x 12	CR-SL, CR-ML	2B.20
R3-6 (R or L)		Black on White	30 x 36	CR-SL, CR-ML	2B.21,6F.6
R3-7 (R, L, ALL)		Black on White	30 x 30 36 x 36	CR-SL CR-ML	2B.20,6F.6 2B.20
R3-9a		Black on White	30 x 36	CR-SL, CR-ML	2B.24
R3-9b		Black on White	24 x 36 36 x 48	CR-SL, CR-ML O	2B.24 2B.24
R3-9cP		Black on White	30 x 12	CR-SL, CR-ML	2B.25
R3-9dP		Black on White	30 x 12	CR-SL, CR-ML	2B.25

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R3-9e		Black and Red on White	108 x 48	CR-SL, CR-ML	2B.26
R3-9f		White of Black and Black on White	30 x 42 36 x 54	CR-SL CR-ML	2B.20 2B.26
R3-9g		Black on White	108 x 36	CR-SL, CR-ML	2B.26
R3-9h		Black on White	108 x 36	CR-SL, CR-ML	2B.26
R3-9i		Black on White	108 x 48	CR-SL, CR-ML	2B.26
R3-10		Black on White	30 x 42 36 x 60 78 x 96	CR-SL, CR-ML E F, O	2G.4 2G.4 2G.4
R3-10a		Black on White	30 x 42 36 x 60 78 x 96	CR-SL, CR-ML E F, O	2G.4 2G.4 2G.4

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R3-11		Black on White	30 x 42 36 x 60 78 x 96	CR-SL, CR-ML E F, O	2G.5 2G.5 2G.5
R3-11a		Black on White	30 x 42 36 x 60 78 x 96	CR-SL, CR-ML E F, O	2G.5 2G.5 2G.5
R3-11b		Black on White	30 x 42 36 x 60 78 x 96	CR-SL, CR-ML E F, O	2G.5 2G.5 2G.5
R3-11c		Black on White	30 x 42 36 x 60 78 x 96	CR-SL, CR-ML E F, O	2G.5 2G.5 2G.5
R3-11P		Black on White	30 x 15 36 x 18 78 x 36	CR-SL, CR-ML E F, O	2G.5 2G.5 2G.5
R3-12		Black on White	30 x 42 36 x 60 48 x 84	CR-SL, CR-ML E F, O	2G.6 2G.6 2G.6
R3-12a		Black on White	30 x 42 36 x 60 48 x 84	CR-SL, CR-ML E F, O	2G.7 2G.7 2G.7

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R3-12b		Black on White	30 x 42 36 x 60 48 x 84	CR-SL, CR-ML E F, O	2G.7 2G.7 2G.7
R3-12c		Black on White	30 x 42 36 x 60 48 x 84	CR-SL, CR-ML E F, O	2G.7 2G.7 2G.7
R3-12d		Black on White	30 x 42 36 x 60 48 x 84	CR-SL, CR-ML E F, O	2G.7 2G.7 2G.7
R3-12e		Black on White	30 x 42 36 x 60 48 x 84	CR-SL, CR-ML E F, O	2G.6 2G.6 2G.6
R3-12f		Black on White	30 x 42 36 x 60 48 x 84	CR-SL, CR-ML E F, O	2G.6 2G.6 2G.6
R3-12g		Black on White	30 x 42 36 x 60 48 x 84	CR-SL, CR-ML E F, O	2G.7 2G.7 2G.7

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R3-12h		Black on White	30 x 42 36 x 60 48 x 84	CR-SL, CR-ML E F, O	2G.7 2G.7 2G.7
R3-13		Black on White	66 x 36 84 x 48 144 x 78	CR-SL, CR-ML E F, O	2G.4 2G.4 2G.4
R3-13a		Black on White	66 x 36 84 x 48 144 x 78	CR-SL, CR-ML E F, O	2G.4 2G.4 2G.4
R3-14		Black on White	72 x 60 96 x 72 144 x 108	CR-SL, CR-ML E F, O	2G.5 2G.5 2G.5
R3-14a		Black on White	72 x 60 96 x 72 144 x 108	CR-SL, CR-ML E F, O	2G.5 2G.5 2G.5
R3-14b		Black on White	72 x 60 96 x 72 144 x 108	CR-SL, CR-ML E F, O	2G.5 2G.5 2G.5
R3-14c		Black on White	90 x 60 108 x 72 156 x 102	CR-SL, CR-ML E F, O	2G.5 2G.5 2G.5

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R3-15		Black on White	66 x 36 84 x 48 102 x 60	CR-SL, CR-ML E F, O	2G.6 2G.6 2G.6
R3-15a		Black on White	78 x 42 102 x 54 132 x 72	CR-SL, CR-ML E F, O	2G.6 2G.6 2G.6
R3-15b		Black on White	66 x 36 84 x 48 102 x 60	CR-SL, CR-ML E F, O	2G.7 2G.7 2G.7
R3-15c		Black on White	66 x 36 84 x 48 102 x 60	CR-SL, CR-ML E F, O	2G.7 2G.7 2G.7
R3-15d		Black on White	42 x 36 54 x 48 72 x 60	CR-SL, CR-ML E F, O	2G.6 2G.6 2G.6
R3-15e		Black on White	42 x 36 54 x 48 72 x 60	CR-SL, CR-ML E F, O	2G.7 2G.7 2G.7
R3-17		Black on White	24 x 18	B/Rt	9B.4
R3-17aP		Black on White	24 x 8	B/Rt	9B.4
R3-17bP		Black on White	24 x 8	B/Rt	9B.4
R3-18		Black and Red on White	24 x 24 36 x 36	CR-SL, CR-ML E, F	2B.18 2B.18
R3-27		Black and Red on White	24 x 24 36 x 36	CR-SL, CR-ML E, F	2B.18 2B.18

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R3-44		Black on White	90 x 84	E, F	2G.17
R3-44a		Black on White	132 x 84	E, F	2G.17
R3-45		Black on White	90 x 66	E, F	2G.17
R3-45a		Black on White	114 x 66	E, F	2G.17
R3-48		Black on White	Varies	E, F	2G.17
R3-48a		Black on White	Varies	E, F	2G.17
R4-1		Black on White	12 x 18 18 x 24 24 x 30 36 x 48 48 x 60	B-Path B/RT, M CR-SL, CR-ML E, O F	9B.14 2B.28, 9B.14 2B.28, 5B.4, 6F.6 2B.28, 5B.4, 6F.6 2B.28
R4-2		Black on White	12 x 18 18 x 24 24 x 30 36 x 48 48 x 60	B-Path B/RT, M CR-SL, CR-ML E, O F	9B.14 2B.29, 9B.14 2B.29, 5B.4, 6F.6 2B.29, 5B.4, 6F.6 2B.29

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R4-3		Black on White	12 x 18 18 x 24 24 x 30 36 x 48 48 x 60	B-Path B/RT, M CR-SL, CR-ML E, O F	9B.14 2B.30,9B.14 2B.30,5B.4 2B.30,5B.4 2B.30
R4-4		Black on White	36 x 30	B/RT	9B.5
R4-5		Black on White	24 x 30 36 x 48 48 x 60	CR-SL, CR-ML E, O F	2B.31 2B.31 2B.31
R4-7		Black on White	12 x 18 18 x 24 24 x 30 36 x 48 48 x 60	B-Path B/RT, M CR-SL, CR-ML E, O F	9B.14 2B.32,5B.4,9B.14 2B.32,5B.4,6F.6 2B.32,5B.4,6F.6 2B.32
R4-7a		Black on White	18 x 24 24 x 30 36 x 48 48 x 60	M CR-SL, CR-ML E, O F	2B.32 2B.32 2B.32 2B.32
R4-7b		Black on White	18 x 24 24 x 30 36 x 48 48 x 60	M CR-SL, CR-ML E, O F	2B.32 2B.32 2B.32 2B.32
R4-7c		Black on White	18 x 30	CR-SL, CR-ML	2B.32,6F.6
R4-8		Black on White	18 x 24 24 x 30 36 x 48 48 x 60	M CR-SL, CR-ML E, O F	2B.32 2B.32 2B.32 2B.32
R4-8a		Black on White	18 x 24 24 x 30 36 x 48 48 x 60	M CR-SL, CR-ML E, O F	2B.32 2B.32 2B.32 2B.32

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R4-8b		Black on White	18 x 24 24 x 30 36 x 48 48 x 60	M CR-SL, CR-ML E, O F	2B.32 2B.32 2B.32 2B.32
R4-8c		Black on White	18 x 30	CR-SL, CR-ML	2B.32
R4-9		Black on White	18 x 24 24 x 30 36 x 48 48 x 60	M CR-SL, CR-ML E, O F	2B.33 2B.33,6F.11 2B.33,6F.11 2B.33
R4-10		Black on White	48 x 48	CR-SL, CR-ML	2B.34
R4-11		Black on White	308 x 30	B/Rt	9B.6
R4-12		Black on White	42 x 24	CR-SL, CR-ML	2B.35
R4-13		Black on White	42 x 24	CR-SL, CR-ML	2B.35
R4-14		Black on White	30 x 42	CR-SL, CR-ML	2B.35
R4-16		Black on White	18 x 24 24 x 30 36 x 48 48 x 60	M CR-SL, CR-ML E, O F	2B.30,9B.14 2B.30,9B.14 2B.30 2B.30
R4-17a		Black on White	30 x 36 48 x 54	CR-SL, CR-ML E, F	2B.36 2B.36

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R4-18a		Black on White	30 x 36 48 x 54	CR-SL, CR-ML E, F	2B.36 2B.36
R5-1		Red on White	30 x 30 36 x 36 48 x 48	CR-SL CR-ML, E, O F	2B.37,5B.4,6F.6 2B.37,5B.4,6F.6 2B.37
R5-1a		White on Red	30 x 18 36 x 24 42 x 30	M CR-SL, E CR-ML, F, O	2B.38,6F.6 2B.38,6F.6 2B.38
R5-1b		White on Red	12 x 18	B-Path, B/Rt	9B.7
R5-2		Black and Red on White	24 x 24 30 x 30 36 x 36	CR-SL, CR-ML E F, O	2B.39,5B.4 2B.39,5B.4 2B.39
R5-2a		Black and Red on White	24 x 24 30 x 30 36 x 36	CR-SL, CR-ML E F, O	2B.39,5B.4 2B.39,5B.4 2B.39
R5-3		Black on White	24 x 24	B-Path, B/Rt, CR-SL, CR-ML, M	2B.39, 9B.8,9B.14
R5-4		Black on White	24 x 30 36 x 48	CR-SL, CR-ML E, F	2B.39 2B.39
R5-5		Black on White	24 x 30 36 x 48 48 x 60	CR-SL, CR-ML E F	2B.39 2B.39 2B.39
R5-6		Black and Red on White	18 x 18 24 x 24 30 x 30 36 x 36 48 x 48	B-Path B/Rt, CR-SL, CR-ML, M E F O	9B.9 2B.39,9B.9 2B.39 2B.39 2B.39

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R5-7		Black on White	30 x 24 42 x 24 48 x 30 42 x 24	CR-SL, CR-ML E F O	2B.39 2B.39 2B.39 2B.39
R5-8		Black on White	30 x 24 42 x 24 48 x 30 42 x 24	CR-SL, CR-ML E F O	2B.39 2B.39 2B.39 2B.39
R5-10a		Black on White	30 x 36	CR-SL, CR-ML	2B.39
R5-10b		Black on White	30 x 18	CR-SL, CR-ML	2B.39
R5-10c		Black on White	24 x 12	CR-SL, CR-ML	2B.39
R5-10d		Black on White	18 x 24	CR-SL, CR-ML	2B.39
R5-X1		Black on White	18 x 18	CR-SL, CR-ML, M	2B.39.1
R6-1 (R or L)		Black on White	36 x 12 54 x 18	CR-SL CR-ML, E, F, O	2B.40,6F.6 2B.40,6F.6
R6-2 (R or L)		Black on White	18 x 24 24 x 30 30 x 36 36 x 48 48 x 60	M CR-SL CR-ML E, O F	2B.40,5B.4,6F.6 2B.40,6F.6 2B.40 2B.40,6F.6 2B.40
R6-3		Black on White	30 x 24 36 x 30	CR-SL, CR-ML E, O	2B.42 2B.42
R6-3a		Black on White	30 x 24 36 x 30	CR-SL, CR-ML E, O	2B.42 2B.42

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R7-4		Red on White	12 x 18	CR-SL, CR-ML	2B.46
R7-5		Green on White	12 x 18	CR-SL, CR-ML	2B.46
R7-6		Red on White	12 x 18	CR-SL, CR-ML	2B.46
R7-7		Red on White	12 x 18	CR-SL, CR-ML	2B.46
R7-8m		White on Blue	12 x 18	CR-SL, CR-ML	2B.46,2B.48.1
R7-8bP		White on Blue	18 x 9	CR-SL, CR-ML	2B.46,2B.48.1
R7-9		Red on White	12 x 18	B/Rt	9B.10
R7-9a		Black and Red on White	12 x 18	B/Rt	9B.10
R7-20		Green on White	24 x 18	CR-SL, CR-ML	2B.46
R7-21		Green and Black on White	12 x 18	CR-SL, CR-ML	2B.46
R7-21a		Green and Black on White	12 x 18	CR-SL, CR-ML	2B.46

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R7-22		Green and Black on White	12 x 18	CR-SL, CR-ML	2B.46
R7-23		Black and Red on White	12 x 18	CR-SL, CR-ML	2B.46
R7-23a		Green and Black on White	12 x 18	CR-SL, CR-ML	2B.46
R7-107		Red on White	12 x 18	CR-SL, CR-ML	2B.46
R7-107b		Red and Black on White	12 x 30	CR-SL, CR-ML	2B.46
R7-108		Green on White	12 x 18	CR-SL, CR-ML	2B.46
R7-200		Red and Green on White	24 x 18	CR-SL, CR-ML	2B.46
R7-200a		Red and Green on White	12 x 30	CR-SL, CR-ML	2B.46
R7-201P		Black or Red on White	12 x 6	CR-SL, CR-ML	2B.46

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R7-201aP		Red on White	12 x 6	CR-SL, CR-ML	2B.46
R7-202P		Red on White	12 x 6	CR-SL, CR-ML	2B.46
R7-203		Red on White	18 x 24 24 x 30	CR-SL, CR-ML O	2B.46 2B.46
R8-1		Red on White	24 x 30 36 x 48 48 x 60	CR-SL, CR-ML E, O F	2B.46 2B.46 2B.46
R8-2		Red on White	24 x 30 36 x 48 48 x 60	CR-SL, CR-ML E, O F	2B.46 2B.46 2B.46
R8-3		Black and Red on White	12 x 12 18 x 18 24 x 24 30 x 30 36 x 36 48 x 48	M M CR-SL CR-ML E, O F	2B.46 5B.5 2B.46,5B.5,6F.13 2B.46,5B.5 2B.46, 6F.13 2B.46
R8-3a		Red on White	18 x 24 24 x 30 36 x 48 48 x 60	CR-SL, CR-ML E, O F	2B.46 2B.46 2B.46 2B.46
R8-3bP		Red on White	12 x 9 24 x 18 30 x 24	M CR-SL, CR-ML O	2B.46 2B.46 2B.46
R8-3cP		Red on White	12 x 9 24 x 18 30 x 24	M CR-SL, CR-ML O	2B.46 2B.46,5B.5 2B.46,5B.5
R8-3dP		Red on White	12 x 9 24 x 18 30 x 24	M CR-SL, CR-ML O	2B.46 2B.46,5B.5 2B.46,5B.5
R8-3eP		Red on White	12 x 9 30 x 24	M, CR-SL, CR-ML O	2B.46 2B.46

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R8-3fP		Red on White	12 x 9 24 x 18 30 x 24	M CR-SL, CR-ML O	2B.46 2B.46 2B.46
R8-3gP		Red on White	12 x 9 24 x 18 30 x 24	M CR-SL, CR-ML O	2B.46 2B.46 2B.46
R8-3hP		Red on White	12 x 9 24 x 18 30 x 24	M CR-SL, CR-ML O	2B.46 2B.46 2B.46
R8-3mP		Red on White	12 x 9 24 x 18 30 x 24	M CR-SL, CR-ML O	2B.46 2B.46 2B.46
R8-4		Black on White	30 x 24 48 x 36	CR-SL, CR-ML, E F, O	2B.49 2B.49
R8-5		Red on White	24 x 30 36 x 48 48 x 60	CR-SL, CR-ML E, O F	2B.46 2B.46
R8-6		Red on White	24 x 30 36 x 48 48 x 60	CR-SL, CR-ML E, O F	2B.46 2B.46
R8-7		Black on White	30 x 24 48 x 36	CR-SL, CR-ML E, F, O	2B.46, 2B.49 2B.46, 2B.49
R8-8		Black on White	24 x 30 36 x 48 48 x 60	CR-SL, CR-ML E O	2B.49, 8B.8 2B.49, 8B.8 2B.49, 8B.8
R8-9		Black on White	24 x 24 36 x 36 48 x 48	CR-SL, CR-ML E O	8B.10 8B.10 8B.10
R8-10		Black on White	24 x 36 36 x 48	CR-SL, CR-ML O	8B.11 8B.11

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R9-7		Black on White	12 x 18	B-Path, B/Rt	9B.11
R9-8		Black on White	36 x 18	CR-SL, CR-ML	6F.13
R9-9		Black on White	30 x 18 24 x 12	CR-SL, CR-ML M	2B.58.2,6F14 2B.58.2,6F14
R9-10 (R or L)		Black on White	48 x 24 24 x 12	CR-SL, CR-ML M	2B.58.2,6F14 2B.58.2,6F14
R9-11 (R or L)		Black on White	24 x 18	CR-SL, CR-ML	6F14
R9-11a (R or L)		Black on White	24 x 12	CR-SL, CR-ML	6F14
R9-13		Black and Red on White	18 x 18 24 x 24 30 x 30	B-Path, B/Rt, CR-SL, CR-ML E F, O	2B.39,9B.9 2B.39 2B.39
R9-14		Black and Red on White	18 x 18 24 x 24 30 x 30	B-Path, B/Rt, CR-SL, CR-ML E F, O	2B.39,9B.9 2B.39 2B.39
R9-X1		Black on White	12 x 18	B-Path, B/Rt	9B.11
R9-X2		Black on White	12 x 18	B-Path, B/Rt	9B.11
R10-1		Black and green on White	12 x 18	B-Path, B/Rt	2B.52,9B.11
R10-2		Black on White	12 x 18	CR-SL, CR-ML	2B.52
R10-3		Black on White	9 x 12	CR-SL, CR-ML	2B.52

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R10-3a		Black on White	9 x 15	CR-SL, CR-ML	2B.52
R10-3b		Black and Orange on White	9 x 12	CR-SL, CR-ML	2B.52
R10-3c		Black and Orange on White	9 x 12	CR-SL, CR-ML	2B.52
R10-3d		Black and Orange on White	9 x 12	CR-SL, CR-ML	2B.52
R10-3e		Black and Orange on White	9 x 15	CR-SL, CR-ML	2B.52
R10-3f		Black and Orange on White	9 x 15	CR-SL, CR-ML	2B.52
R10-3g		Black and Orange on White	9 x 15	CR-SL, CR-ML	2B.52
R10-3h		Black and Orange on White	9 x 15	CR-SL, CR-ML	2B.52
R10-3i		Black and Orange on White	9 x 15	CR-SL, CR-ML	2B.52

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R10-4		Black and Green on White	9 x 15	B-Path, B/Rt, CR-SL, CR-ML	2B.52,9B.11
R10-4a		Black and Green on White	9 x 15	CR-SL, CR-ML	2B.52
R10-5		Black on White	24 x 30 30 x 36 48 x 60	M CR-SL, CR-ML E, O	2B.53
R10-6 (L or R)		Black on White	24 x 36 36 x 48	CR-SL, CR-ML O	2B.53,8B.12 2B.53,8B.12
R10-6a (L or R)		Black on White	24 x 30 36 x 42	CR-SL, CR-ML O	2B.53, 8B.12 2B.53, 8B.12
R10-7		Black on White	24 x 30	CR-SL, CR-ML	2B.53
R10-7a		Black on White	24 x 30	CR-SL, CR-ML	2B.53
R10-8		Black on White	36 x 42 60 x 72	CR-SL, CR-ML, E O	2B.53 2B.53
R10-10 (R or L)		Black on White	30 x 36	CR-SL, CR-ML	2B.53

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Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R10-11		Black and Red on White	24 x 30 36 x 48	CR-SL CR-ML, O	2B.54 2B.54
R10-11a		Black on White	30 x 36 36 x 48	CR-SL CR-ML	2B.54 2B.54
R10-11b		Black on White	36 x 36	CR-SL, CR-ML	2B.54
R10-11c		Black on White	30 x 42	CR-SL, CR-ML	2B.54
R10-11d		Black on White	30 x 42	CR-SL, CR-ML	2B.54
R10-12		Black on White	30 x 36	CR-SL, CR-ML	2B.53
R10-13		Black on White	42 x 30	CR-SL, CR-ML	2B.53
R10-14		Black on White	36 x 42	CR-SL, CR-ML	2B.53
R10-14a		Black on White	60 x 24	CR-SL, CR-ML	2B.53

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R10-15a		Black, Red and Green on White and Fluorescent Green	30 x 30	CR-SL, CR-ML	2B.53
R10-16		Black on White	30 x 36	CR-SL, CR-ML	2B.53
R10-17a		Black on White	36 x 48	CR-SL, CR-ML	2B.54
R10-18		Black on White	36 x 24 48 x 30 54 x 36	CR-SL, CR-ML E F, O	2B.55 2B.55 2B.55
R10-19P		Black on White	24 x 12 36 x 18 48 x 24	CR-SL, CR-ML E F, O	2B.55 2B.55 2B.55
R10-19aP		Black on White	24 x 18 36 x 30 48 x 36	CR-SL, CR-ML E F, O	2B.55 2B.55 2B.55
R10-20aP		Black on White	24 x 24	CR-SL, CR-ML	2B.53
R10-20aP		Black on White	24 x 18 30 x 24 48 x 36	CR-SL, CR-ML E O	2B.53 2B.53 2B.53
R10-22		Black on White	12 x 18	B-Path, B/Rt	9B.13
R10-23		Black and Red on White	24 x 30	CR-SL, CR-ML	2B.53

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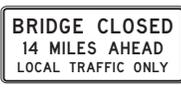
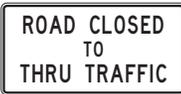
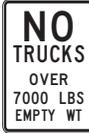
Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R10-24		Black on White	9 x 15	B-Path, B/Rt	9B.11
R10-25		Black on White	9 x 12	B-Path, B/Rt, CR-SL, CR-ML	2B.52, 9B.11
R10-26		Black on White	9 x 15	B-Path, B/Rt	9B.11
R10-27		Black on White	30 x 36	CR-SL, CR-ML	2B.53
R10-28a		Black on White	24 x 30	CR-SL, CR-ML	2B.56
R10-29a		Black on White	36 x 24	CR-SL, CR-ML	2B.56
R10-30		Black on White	30 x 36	CR-SL, CR-ML	2B.54
R10-31P		Black on White	24 x 9	CR-SL, CR-ML	2B.54
R10-32P		Black on White	9 x 12	CR-SL, CR-ML	2B.52
R10-X1		Black on White	24 x 30	CR-SL, CR-ML	6E.5

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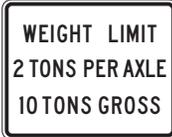
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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R11-1		Black on White	24 x 30	CR-SL, CR-ML	2B.57
R11-2		Black on White	48 x 30	CR-SL, CR-ML	2B.58, 5B.4, 6F.8
R11-2a		Black on White	48 x 30	CR-SL, CR-ML	2B.58.1
R11-3a		Black on White	60 x 30	CR-SL, CR-ML	2B.58, 5B.4, 6F.9
R11-3b		Black on White	60 x 30	CR-SL, CR-ML	2B.58, 5B.4, 6F.9
R11-3c		Black on White	60 x 30	CR-SL, CR-ML	2B.58.1
R11-4		Black on White	60 x 30	CR-SL, CR-ML	2B.58, 5B.4, 6F.9
R12-1		Black on White	24 x 36	CR-SL, CR-ML	2B.59
R12-1a		Black on White	24 x 30 36 x 48	CR-SL, CR-ML E, F, O	2B.59.1, 5B.4, 6F.10 2B.59.1, 5B.4, 6F.10
R12-2		Black on White	24 x 30 36 x 48	CR-SL, CR-ML E, F, O	2B.59, 5B.4, 6F.10 2B.59, 5B.4, 6F.10
R12-3		Black on White	24 x 36	CR-SL, CR-ML	2B.59

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Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R12-4		Black on White	36 x 24	CR-SL, CR-ML	2B.59
R12-5		Black on White	24 x 36 36 x 48 48 x 60	CR-SL, CR-ML E F	2B.59.1,6F.10 2B.59.1,6F.10 2B.59.1,6F.10
R12-X2		Black on White	60 x 36	CR-SL, CR-ML	2B.59.1
R12-X3		Black on White	36 x 24	CR-SL, CR-ML	2B.59.1
R12-X3a		Black on White	42 x 24	CR-SL, CR-ML	2B.59.1
R12-X4		Black on White	60 x 42	CR-SL, CR-ML	2B.59.1
R12-X4a		Black on White	60 x 36	CR-SL, CR-ML	2B.59.1
R13-1		Black on White	72 x 54 96 x 72 120 x 90	CR-SL, CR-ML E F	2B.60 2B.60 2B.60
R14-1		Black on White	24 x 18	CR-SL, CR-ML	2B.61
R14-2		Black and Green on White	24 x 24 30 x 30 36 x 36	CR-SL, CR-ML E F	2B.62 2B.62 2B.62
R14-3		Black and Red on White	24 x 24 30 x 30 36 x 36	CR-SL, CR-ML E F	2B.62 2B.62 2B.62

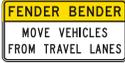
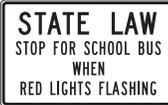
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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R14-4		Black and Green on White	30 x 30 36 x 36	CR-SL, CR-ML E, F	2B.63 2B.63
R14-5		Black and Red on White	30 x 30 36 x 36	CR-SL, CR-ML E, F	2B.63 2B.63
R15-1		Black on White	24 x 4.5 48 x 9	B-Path B-Rt, CR-SL, CR-ML	9B.14 5F.2, 8B.3
R15-2P		Black on White	13.5 x 9 27 x 18	B-Path B-Rt, CR-SL, CR-ML	9B.14 5F.2, 8B.3
R15-3P		Black on White	24 x 12	CR-SL, CR-ML	8B.7
R15-4a		Black on White	24 x 30	CR-SL, CR-ML	8B.13
R15-4b		Black on White	24 x 30	CR-SL, CR-ML	8B.13
R15-4c		Black on White	24 x 30	CR-SL, CR-ML	8B.13
R15-5		Black on White	24 x 30	CR-SL, CR-ML	8B.14
R15-5a		Black on White	24 x 30	CR-SL, CR-ML	8B.14
R15-6		Black on White	24 x 24	CR-SL, CR-ML	8B.15

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R15-6a		Black on White	24 x 30	CR-SL, CR-ML	8B.15
R15-7		Black on White	24 x 24	CR-SL, CR-ML	8B.16
R15-7a		Black on White	24 x 24	CR-SL, CR-ML	8B.16
R15-8		Black on White	18 x 9 36 x 18	B-Path B/Rt, CR-SL, CR-ML	9B.14 8B.17,9B.14
R16-4		Black on White and Yellow	36 x 24 48 x 36 60 x 48	CR-SL, CR-ML E, O F	2B.65 2B.65 2B.65
R16-5		Black on White	24 x 30 36 x 48 48 x 60	CR-SL, CR-ML E, O F	2B.64 2B.64 2B.64
R16-6		Black on White	24 x 30 36 x 48 48 x 60	CR-SL, CR-ML E, O F	2B.64 2B.64 2B.64
R16-7		Black on White	48 x 15 72 x 24 96 x 30	CR-SL, CR-ML E, O F	2B.64 2B.64 2B.64
R16-8		Black on White	30 x 15 48 x 24 60 x 30	CR-SL, CR-ML E, O F	2B.64 2B.64 2B.64
R16-9		Black on White	30 x 15 48 x 24 60 x 30	CR-SL, CR-ML E, O F	2B.64 2B.64 2B.64
R16-10		Black on White	48 x 15 72 x 24 96 x 30	CR-SL, CR-ML E, O F	2B.64 2B.64 2B.64
R16-11		Black on White	48 x 15 72 x 24 96 x 30	CR-SL, CR-ML E, O F	2B.64 2B.64 2B.64
R16-X1		Black on White	72 x 48	CR-SL, CR-ML, E	2B.66.2

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R16-X2		Black on White	78 x 48	CR-SL, CR-ML, E, F	2B.66.2
R16-X3		Black on White	48 x 30	CR-SL, CR-ML, E	2B.66.2
R16-X4		Black on White	36 x 36	E, F	2B.49
R16-X6		Black on White	30 x 30 48 x 48	CR-SL CR-ML	2B.66.1
R16-X8		Black on White	30 x 18 36 x 24	CR-SL CR-ML	2B.66.1
R16-X9		Black on White	60 x 48	CR-SL, CR-ML	2B.66.2
R16-X10		Black on White	18 x 24	CR-SL, CR-ML	2B.66.1
R16-X11		Black on White	72 x 36	CR-SL, CR-ML, E, F	2B.66.2
R16-X12		Black on White	18 x 18	CR-SL, CR-ML	2B.66.1
R16-X13		Black on White	24 x 24	CR-SL, CR-ML	2B.66.1

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
R16-X16		Black on White	30 x 48 48 x 66	CR-SL, CR-ML E, F	2B.33.1 2B.33.1
R16-X33		Black on White	24 x 30	CR-SL, CR-ML	2B.66.1

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W1-7		Black on Yellow	24 x 12 36 x 18 48 x 24 60 x 30	B-Path B/Rt CR-SL, CR-ML O	9B.15 5C.2,9B.15 2C.47,5C.2,6F.50 2C.47,6F.50
W1-8 (R or L)		Black on Yellow	12 x 18 18 x 24 24 x 30 30 x 36 36 x 48	CR-SL CR-SL, CR-ML O E F	5C.2 2C.9,5C.2,6F.50 2C.9 2C.9,6F.50 2C.9,6F.50
W1-10 (R or L)		Black on Yellow	36 x 36 48 x 48	CR-SL, CR-ML, E F	2C.11 2C.11
W1-10a (R or L)		Black on Yellow	36 x 36 48 x 48	CR-SL, CR-ML, E F	2C.11 2C.11
W1-10b (R or L)		Black on Yellow	36 x 36 48 x 48	CR-SL, CR-ML, E F	2C.11 2C.11
W1-10c (R or L)		Black on Yellow	36 x 36 48 x 48	CR-SL, CR-ML, E F	2C.11 2C.11
W1-10d (R or L)		Black on Yellow	36 x 36 48 x 48	CR-SL, CR-ML, E F	2C.11 2C.11
W1-10e (R or L)		Black on Yellow	36 x 36 48 x 48	CR-SL, CR-ML, E F	2C.11 2C.11
W1-11 (R or L)		Black on Yellow	30 x 30 36 x 36 48 x 48	CR-SL, CR-ML E F, O	2C.7 2C.7 2C.7
W1-13 (R or L)		Black on Yellow	36 x 36 48 x 48	CR-SL, CR-ML, E, O F	2C.13 2C.13

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W1-15 (R or L)		Black on Yellow	30 x 30 36 x 36 48 x 48	CR-SL, CR-ML E F, O	2C.7 2C.7 2C.7
W1-X1 (R or L)		Black on Orange	36 x 36 48 x 48	CR-SL, CR-ML E, F	6F.49 6F.49
W1-X1b (R or L)		Black on Orange	48 x 48 60 x 60	E, F O	6F.49 6F.49
W2-1		Black on Yellow	18 x 18 24 x 24 30 x 30 36 x 36 48 x 48	B-Path B/Rt, M CR-SL, CR-ML E O	9B.16 9B.16 2C.46,5C.3, 2C.46,5C.3 2C.46
W2-2 (R or L)		Black on Yellow	18 x 18 24 x 24 30 x 30 36 x 36 48 x 48	B-Path B/Rt, M CR-SL, CR-ML E O	9B.16 9B.16 2C.46,5C.3, 2C.46,5C.3 2C.46
W2-3 (R or L)		Black on Yellow	18 x 18 24 x 24 30 x 30 36 x 36 48 x 48	B-Path B/Rt, M CR-SL, CR-ML E O	9B.16 9B.16 2C.46,5C.3, 2C.46,5C.3 2C.46
W2-4		Black on Yellow	18 x 18 24 x 24 30 x 30 36 x 36 48 x 48	B-Path B/Rt, M CR-SL, CR-ML E O	9B.16 9B.16 2C.46,5C.3, 2C.46,5C.3 2C.46
W2-5		Black on Yellow	18 x 18 24 x 24 30 x 30 36 x 36 48 x 48	B-Path B/Rt, M CR-SL, CR-ML E O	9B.16 9B.16 2C.46,5C.3, 2C.46,5C.3 2C.46
W2-6		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E O	2C.46,5C.3, 2C.46,5C.3 2C.46 2C.46

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W2-7 (R or L)		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E O	2C.46 2C.46 2C.46 2C.46
W2-8 (R or L)		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E O	2C.46 2C.46 2C.46 2C.46
W2-X1		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E O	2C.46 2C.46 2C.46 2C.46
W2-X12		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E O	2C.46 2C.46 2C.46 2C.46
W3-1		Black on Yellow	18 x 18 30 x 30 36 x 36 48 x 48	B-Path B/Rt, M, CR-SL, CR-ML CR-SL, CR-ML E, F	9B.19 2C.36,5C.4,6F.16, 8B.6,9B.19 5C.4,6F.50,8B.6 2C.36,6F.50,8B.6
W3-2		Black on Yellow	18 x 18 30 x 30 36 x 36 48 x 48	B-Path B/Rt, M, CR-SL, CR-ML CR-SL, CR-ML E, F	9B.19 2C.36,5C.4,6F.16, 8B.6,9B.19 5C.4,6F.50,8B.6 2C.36,6F.50,8B.6
W3-3		Black on Yellow	18 x 18 30 x 30 36 x 36 48 x 48	B-Path B/Rt, M, CR-SL, CR-ML CR-SL, CR-ML E, F	9B.19 2C.36, 6F.50,9B.19 6F.50 2C.36,6F.50
W3-4		Black on Yellow	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	2C.36,6F.50.2 2C.36,5C.4, 6F.50.2,6I.1 2C.36,5C.4, 6F.50.2,6I.1
W3-5		Black on Yellow	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F, O	6F.50 2C.38,5G.4,6F.50 2C.36,5G.4,6F.50

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W3-5a		Black on Yellow	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	2C.38,6F.50 2C.38,6F.50 2C.38,6F.50
W3-6		Black on Yellow	36 x 36 48 x 48 60 x 60	CR-SL, CR-ML E O	2C.39 2C.39 2C.39
W3-7		Black on Yellow	36 x 36	CR-SL, CR-ML	2C.37
W3-8		Black on Yellow	36 x 36	CR-SL, CR-ML	2C.37
W3-X4		Black on Yellow	66 x 42	CR-SL, CR-ML, M, E, O	2C.36
W3-X5		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.30 6F.30 6F.30
W4-1 (R or L)		Black on Yellow	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	2C.40 2C.40,6F.50 2C.40,6F.50
W4-1a (R or L)		Black on Orange	36 x 36 48 x 48	CR-SL, CR-ML, M E, F	6F.23.1 6F.23.1
W4-2 (R or L)		Black on Yellow	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	2C.42,6F.24 2C.42,6F.24 2C.42,6F.24
W4-3 (R or L)		Black on Yellow	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	2C.41,6F.50 2C.41,6F.50 2C.41,6F.50

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W4-4P		Black on Yellow	24 x 12 36 x 18 48 x 24	CR-SL, CR-ML E O	2C.59 2C.59 2C.59
W4-4aP		Black on Yellow	24 x 12 36 x 18 48 x 24	CR-SL, CR-ML E O	2C.59 2C.59 2C.59
W4-4bP		Black on Yellow	24 x 12 36 x 18 48 x 24	CR-SL, CR-ML E O	2C.59 2C.59 2C.59
W4-5		Black on Yellow	36 x 36 48 x 48	CR-SL, CR-ML, M E	2C.40,6F.50 2C.40,6F.50
W4-5P		Black on Yellow	18 x 24 24 x 30	CR-SL, CR-ML E	2C.40,6F.50 2C.40,6F.50
W4-6		Black on Yellow	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E	6F.16 2C.41,6F.50 2C.41,6F.50
W5-1		Black on Yellow	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	2C.19,6F.50 2C.19,6F.50 2C.19,6F.50
W5-2		Black on Yellow	18 x 18 30 x 30 36 x 36 48 x 48	B-Path B/Rt, M CR-SL, CR-ML E, F	9B.19 2C.20,5C.5, 6F.16,9B.19 2C.20,5C.5, 6F.50 2C.20,6F.50
W5-3		Black on Yellow	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	2C.21,5C.6, 6F.50 2C.21,5C.6, 6F.16 2C.21,6F.16
W5-4		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.26 6F.26 6F.26
W5-4a		Black on Yellow	18 x 18	B-Path	9B.19

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W5-X1		Black on Yellow	36 x 36 48 x 48	CR-SL, CR-ML E, F	2C.31
W6-1		Black on Yellow	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.50 2C.22,6F.50 2C.22,6F.50
W6-2		Black on Yellow	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.50 2C.23,6F.50 2C.23,6F.50
W6-3		Black on Yellow	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.32 2C.44,6F.32 2C.44,6F.32
W6-4		Black on Orange	12 x 18	CR-SL, CR-ML, E, F	6F.76
W7-1		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL CR-ML, E, F O	2C.16 2C.16,5C.7,6F.50 2C.16,5C.6,6F.50 2C.16,6F.50
W7-1a		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL CR-ML, E, F O	2C.16 2C.16 2C.16 2C.16
W7-2P		Black on Yellow	24 x 18	CR-SL, CR-ML	2C.57
W7-2bP		Black on Yellow	24 x 18	CR-SL, CR-ML	2C.57
W7-3P		Black on Yellow	24 x 18 30 x 24	CR-SL, CR-ML O	2C.57,5C.7 5C.7
W7-3aP		Black on Yellow	24 x 18 30 x 24 36 x 30	CR-SL, CR-ML O E, F	2C.55,2C.57,5C.9, 6F.50.1,6F.53 2C.55,5C.9, 6F.50.1,6F.53 6F.50.1,6F.53
W7-3bP		Black on Yellow	24 x 18	CR-SL, CR-ML	2C.57

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W7-4		Black on Yellow	78 x 48	CR-SL-CR-ML, E, F	2C.17
W7-4b		Black on Yellow	78 x 60	CR-SL, CR-ML, E, F	2C.17
W7-4c		Black on Yellow	78 x 60	CR-SL, CR-ML, E, F	2C.17
W7-4dP		Black on Yellow	24 x 12	CR-SL, CR-ML, E, F	2C.17
W7-4eP		Black on Yellow	24 x 12	CR-SL, CR-ML, E, F	2C.17
W7-4fP		Black on Yellow	24 x 12	CR-SL, CR-ML, E, F	2C.17
W7-5		Black on Yellow	18 x 18 30 x 30	B-Path B/Rt	9B.19 9B.19
W7-6		Black on Yellow	30 x 30 36 x 36 48 x 48	CR-SL CR-ML, E O	2C.18 2C.18 2C.18
W8-1		Black on Yellow	18 x 18 24 x 24 30 x 30 36 x 36 48 x 48	B-Path B/Rt, M CR-SL CR-ML, E F, O	9B.17,9B.19 2C.28,9B.17, 9B.19 2C.28,6F.50.1 2C.28,6F.50.1 2C.28,6F.50.1
W8-1a		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL CR-ML, E F, O	2C.28 2C.28,6F.50.1 2C.28,6F.50.1 2C.28,6F.50.1
W8-1b		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL CR-ML, E F, O	2C.28 2C.28 2C.28 2C.28

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W8-9		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M M CR-SL, CR-ML, E F, O	2C.31 6F.44.2 2C.31,6F.44.2 2C.31,6F.44.2
W8-9a		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.44.1 6F.44.1 6F.44.1
W8-10		Black on Yellow	18 x 18 30 x 30	B-Path B/Rt	9B.17 9B.17
W8-10P		Black on Yellow	12 x 9	B-Path, B/Rt	9B.17
W8-11		Black on Yellow	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.45 2C.32, 6F.45 2C.32,6F.45
W8-12		Black on Yellow	36 x 36 48 x 48	CR-SL, CR-ML, E F	2C.34 2C.34
W8-12a		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.47 6F.47 6F.47
W8-13		Black on Yellow	24 x 24 36 x 36 48 x 48	M CR-SL, CR-ML, E F, O	2C.32 2C.32 2C.32
W8-14		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML, M E F, O	2C.32 2C.32,6F.47 2C.32,6F.47 2C.32,6F.47
W8-15		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML, M E F, O	2C.33 2C.33,6F.50 2C.33,6F.50 2C.33,6F.50
W8-15P		Black on Yellow	24 x 18 30 x 24 36 x 30	CR-SL, CR-ML E F, O	2C.33 2C.33,6F.54 2C.33, 6F.54

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W8-16		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E F, O	2C.33 2C.33 2C.33 2C.33
W8-17		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E F, O	2C.31 2C.31 2C.31 2C.31
W8-17P		Black on Yellow	24 x 18 36 x 30	CR-SL, CR-ML, E F, O	2C.31 2C.31
W8-18		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL CR-SL, CR-ML, E F, O	2C.35 2C.35,5G.5, 6F.50 2C.35,5G.5 6F.50 2C.35,6F.50
W8-19		Black on Yellow	12 x 72	CR-SL, CR-ML	2C.35
W8-21		Black on Yellow	24 x 24 36 x 36 48 x 48	M CR-SL, CR-ML, E F, O	2C.35 2C.35 2C.35
W8-22		Black on Yellow	24 x 24 36 x 36 48 x 48	M CR-SL, CR-ML, E F, O	2C.35 2C.35 2C.35
W8-23		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M M CR-SL, CR-ML, E F, O	2C.31 6F.44 2C.31,6F.44 2C.31,6F.44
W8-24		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.46 6F.46 6F.46
W8-25		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E F, O	2C.31 2C.31,6F.50 2C.31,6F.50 2C.31,6F.50

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W9-1 (R or L)		Black on Yellow	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML, E F, O	2C.42,6F.50 2C.42,6F.50 2C.42,6F.50
W9-2 (R or L)		Black on Yellow	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML, E F, O	2C.42,6F.50 2C.42,6F.50 2C.42,6F.50
W9-6		Black on Yellow	96 x 66	CR-SL, CR-ML, E, F	2F.6 2F.6
W9-6P		Black on Yellow	288 x 36	CR-SL, CR-ML, E, F	2F.7 2F.7
W9-6a		Black on Yellow	114 x 66	CR-SL, CR-ML, E, F	2F.8 2F.8
W9-6aP		Black on Yellow	252 x 36	CR-SL, CR-ML, E, F	2F.9 2F.9
W9-7 (R or L)		Black on Yellow	132 x 72	CR-SL, CR-ML, E, F	2C.43 2C.43
W10-1		Black on Yellow	24 in. Diameter 36 in. Diameter 48 in. Diameter	B-Path B/Rt, CR-SL, CR-ML E, O	9B.19, 5F.3,6F.16,8B.6, 9B.19 8B.6
W10-1aP		Black on Yellow	24 x 12	CR-SL, CR-ML	8B.7
W10-2 (R or L)		Black on Yellow	36 x 36 48 x 48	CR-SL, CR-ML E, O	5F.3 5F.3,8B.6 8B.6
W10-3 (R or L)		Black on Yellow	36 x 36 48 x 48	CR-SL, CR-ML E, O	5F.3 5F.3,8B.6 8B.6
W10-4 (R or L)		Black on Yellow	30 x 30 36 x 36 48 x 48	CR-SL CR-SL, CR-ML E, O	5F.3 5F.3,8B.6 8B.6

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W10-5		Black on Yellow	36 x 36 48 x 48	CR-SL, CR-ML E, O	8B.23 8B.23
W10-5P		Black on Yellow	30 x 24	CR-SL, CR-ML	8B.23
W10-7		Black and white on Yellow	24 x 24	CR-SL, CR-ML	8B.19
W10-8		Black on Yellow	30 x 30 36 x 36 48 x 48	CR-SL CR-SL, CR-ML E, O	5F.6 5F.6,8B.20 8B.20
W10-9		Black on Yellow	36 x 36 48 x 48	CR-SL, CR-ML E, O	8B.21 8B.21
W10-9P		Black on Yellow	18 x 12 30 x 24	B-Path B/Rt, CR-SL, CR-ML	9B.19 8B.21,9B.19
W10-11		Black on Yellow	30 x 30 36 x 36 48 x 48	CR-SL CR-SL, CR-ML E, O	5F.6 5F.36,8B.24 8B.24
W10-11a		Black on Yellow	30 x 36	CR-SL, CR-ML	8B.24
W10-11b		Black on Yellow	30 x 36	CR-SL, CR-ML	8B.24
W10-12		Black on Yellow	18 x 18 30 x 30 36 x 36 48 x 48	B-Path CR-SL B/Rt, CR-SL, CR-ML E, O	9B.19 5F.6 5F.36,8B.25 9B.19 8B.25
W10-13P		Black on Yellow	30 x 24	CR-SL, CR-ML	8B.22
W10-14P		Black on Yellow	30 x 24	CR-SL, CR-ML	8B.23

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W10-14aP		Black on Yellow	30 x 24	CR-SL, CR-ML	8B.23
W10-15P		Black on Yellow	30 x 24	CR-SL, CR-ML	8B.23
W10-X2		Black on Yellow	36 x 36 48 x 48	CR-SL, CR-ML, E, O	8B.6.1 8B.6.1
W10-X3		Black on Yellow	36 x 36 48 x 48	CR-SL, CR-ML, E, O	8B.6.1 8B.6.1
W11-1		Black on Yellow or Fluorescent Yellow-Green	18 x 18 24 x 24 30 x 30 36 x 36 48 x 48	B-Path B/Rt, M CR-SL, CR-ML, E, O O	9B.18 2C.49,9B.18 2C.49,5C.9 2C.49,5C.9 2C.49
W11-2		Black on Yellow or Fluorescent Yellow-Green	18 x 18 24 x 24 30 x 30 36 x 36 48 x 48	B-Path B/Rt, M CR-SL, CR-ML, E, O O	9B.19 2C.50,9B.19 2C.50,5C.9 2C.50,5C.9 2C.50
W11-3		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, O O	2C.50 2C.50,5C.9 2C.50,5C.9 2C.50
W11-4		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, O O	2C.50 2C.50,5C.9 2C.50,5C.9 2C.50
W11-5		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, O O	2C.49 2C.49,5C.9 2C.49,5C.9 2C.49
W11-5a		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, O O	2C.49 2C.49,5C.9 2C.49,5C.9 2C.49
W11-6		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, O O	2C.49 2C.49,5C.9 2C.49,5C.9 2C.49

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W11-7		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, O O	2C.50 2C.50,5C.9 2C.50,5C.9 2C.50
W11-8		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, O O	2C.49 2C.49,5C.9 2C.49,5C.9 2C.49
W11-9		Black on Yellow or Fluorescent Yellow-Green	30 x 30 36 x 36 48 x 48	CR-SL, CR-ML E, O O	2C.50,5C.9 2C.50,5C.9 2C.50
W11-10		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, O O	2C.49 2C.49,5C.9,6F.36 2C.49,5C.9,6F.36 2C.49,6F.36
W11-11		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, O O	2C.49 2C.49,5C.9 2C.49,5C.9 2C.49
W11-12P		Black on Yellow	36 x 30	CR-SL, CR-ML, E	2C.49 2C.49
W11-14		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, O O	2C.49 2C.49,5C.9 2C.49,5C.9 2C.49
W11-15		Black on Yellow or Fluorescent Yellow-Green	18 x 18 24 x 24 30 x 30 36 x 36 48 x 48	B-Path M B/Rt, CR-SL, CR-ML E, O O	9B.18 2C.49 2C.49,5C.9,9B.18 2C.49,5C.9 2C.49
W11-15a		Black on Yellow or Fluorescent Yellow-Green	18 x 18 24 x 24 30 x 30 36 x 36 48 x 48	B-Path M B/Rt, CR-SL, CR-ML E, O O	9B.18 2C.49 2C.49,5C.9,9B.18 2C.49,5C.9 2C.49
W11-15P		Black on Yellow or Fluorescent Yellow-Green	12 x 18 24 x 18 30 x 24 36 x 30	B-Path B/Rt, CR-SL, CR-ML E O	9B.18 2C.49,5C.9,9B.18 2C.49,5C.9 2C.49

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W11-16		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, O O	2C.50 2C.50,5C.9 2C.50,5C.9 2C.50
W11-17		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, O O	2C.50 2C.50,5C.9 2C.50,5C.9 2C.50
W11-18		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, O O	2C.50 2C.50,5C.9 2C.50,5C.9 2C.50
W11-19		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, O O	2C.50 2C.50,5C.9 2C.50,5C.9 2C.50
W11-20		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, O O	2C.50 2C.50,5C.9 2C.50,5C.9 2C.50
W11-21		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, O O	2C.50 2C.50,5C.9 2C.50,5C.9 2C.50
W11-22		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, O O	2C.50 2C.50,5C.9 2C.50,5C.9 2C.50
W11-X3		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, O O	2C.49 2C.49,5C.9 2C.49,5C.9 2C.49
W11-X21		Black on Yellow	24 x 24 30 x 30 36 x 36	M CR-SL, CR-ML E	2C.50 2C.50,5C.9 2C.50,5C.9
W11-X23		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, O O	2C.50 2C.50,5C.9 2C.59,5C.9 2C.50

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W12-1		Black on Yellow	30 x 30 36 x 36	CR-SL CR-ML, E	2C.25,6F.50 2C.25
W12-2		Black on Yellow	18 x 18 30 x 30 36 x 36 48 x 48	B-Path M CR-SL, CR-ML E, F	9B.19 2C.27,6F.50 2C.27,6F.50 2C.27,6F.50
W12-2a		Black on Yellow	78 x 24	CR-SL, CR-ML	2C.27
W12-X2		Black on Yellow	48 x 24	CR-SL, CR-ML	2C.27
W13-1P		Black on Yellow	18 x 18 24 x 24 30 x 30	CR-SL, CR-ML E F, O	2C.8,5C.10,6F.52 2C.8,5C.10,6F.52 2C.8,6F.52
W13-2		Black on Yellow	24 x 30 36 x 48 48 x 60	CR-SL, CR-ML E, F O	2C.14 2C.14 2C.14
W13-3		Black on Yellow	24 x 30 36 x 48 48 x 60	CR-SL, CR-ML E, F O	2C.14 2C.14 2C.14
W13-4P		Black on Orange	36 x 36	CR-SL, CR-ML E, F	6F.25
W13-6		Black on Yellow	24 x 42 36 x 60 48 x 84	CR-SL, CR-ML E, F O	2C.15 2C.15 2C.15
W13-7		Black on Yellow	24 x 42 36 x 60 48 x 84	CR-SL, CR-ML E, F O	2C.15 2C.15 2C.15
W14-1		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL CR-ML, E O	2C.26 2C.26,5C.11 2C.26,5C.11 2C.26

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W14-1a (R or L)		Black on Yellow	24 x 6 36 x 8	M CR-SL, CR-ML	5C.11 2C.26,5C.11
W14-2		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL CR-ML, E O	2C.26 2C.26,5C.11 2C.26,5C.11 2C.26
W14-2a (R or L)		Black on Yellow	24 x 6 36 x 8	M CR-SL, CR-ML	5C.11 2C.26,5C.11
W14-3		Black on Yellow	40 x 40 x 30 48 x 48 x 36 64 x 64 x 48	M CR-SL, CR-ML O	2C.45,5G.5,6F.50 2C.45,5G.5,6F.50 2C.45,6F.50
W14-X15		Black on Fluorescent Pink	36 x 36 48 x 48	CR-SL, CR-ML E, F	6I.1 6I.1
W15-1		Black on Yellow or Fluorescent Yellow-Green	18 x 18 24 x 24 30 x 30 36 x 36 48 x 48	B-Path B/Rt, M CR-SL CR-ML, E O	9B.19 2C.51,9B.19 2C.51 2C.51 2C.51
W16-1P		Black on Yellow or Fluorescent Yellow-Green	18 x 24 24 x 30	B/Rt, CR-SL, CR-ML E, O	2C.60,9B.19 2C.60
W16-2P		Black on Yellow or Fluorescent Yellow-Green	18 x 12 24 x 18 30 x 24	B-Path B/Rt, CR-SL, CR-ML O	5C.9,9B.18 2C.55,5C.9, 6F.16,7B.8, 9B.18 2C.55,5C.9 6F.16,7B.8
W16-2aP		Black on Yellow or Fluorescent Yellow-Green	18 x 9 24 x 12 30 x 18	B-Path B/Rt, CR-SL, CR-ML O	9B.18 2C.55,7B.8, 9B.18 2C.55,7B.8
W16-3P		Black on Yellow	30 x 24	CR-SL, CR-ML	2C.55
W16-3aP		Black on Yellow	30 x 12	CR-SL, CR-ML	2C.55
W16-4P		Black on Yellow	30 x 24	CR-SL, CR-ML	2C.55

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W16-5P (R or L)		Black on Yellow or Fluorescent Yellow Green	24 x 12 30 x 18	CR-SL, CR-ML O	2C.56,7B.8, 7B.9,7B.11 7B.8,7B.9,7B.11
W16-6P (R or L)		Black on Yellow or Fluorescent Yellow Green	24 x 12 30 x 18	CR-SL, CR-ML O	2C.56,7B.8, 7B.9,7B.11 7B.8,7B.9,7B.11
W16-7P (R or L)		Black on Yellow or Fluorescent Yellow Green	24 x 12 30 x 18	CR-SL, CR-ML O	2C.50,5C.9, 7B.12,9B.18 2C.50,5C.9, 7B.12
W16-8P		Black on Yellow	varies x 8	CR-SL, CR-ML	2C.58
W16-8aP		Black on Yellow	varies x 15	CR-SL, CR-ML	2C.58
W16-9P		Black on Yellow or Fluorescent Yellow-Green	24 x 12 30 x 18	B/Rt, CR-SL, CR-ML E	2C.50,5C.9, 7B.11,9B.18 2C.50,5C.9, 7B.11,9B.18
W16-10P		Black on Yellow	24 x 12 36 x 18 48 x 24	CR-SL, CR-ML E O	2C.61 2C.61 2C.61
W16-10aP		Black on Yellow	24 x 18 36 x 30 48 x 36	CR-SL, CR-ML E O	2C.61 2C.61 2C.61
W16-11P		Black on Yellow	24 x 12 30 x 18	CR-SL, CR-ML E, F, O	2G.9 2G.9
W16-12P		Black on Yellow	24 x 18	CR-SL, CR-ML	2C.46
W16-13P		Black on Yellow	24 x 18	CR-SL, CR-ML	2C.36,2C.49,50
W16-15P		Black on Yellow	24 x 12	CR-SL, CR-ML	2C.62
W16-16P		Black on Yellow	252 x 36	E, F	2F.10
W16-17P		Black on Yellow	24 x 12	CR-SL, CR-ML	2C.46
W16-18P		Black on Yellow	24 x 12	CR-SL, CR-ML	2A.15

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Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W17-1		Black on Yellow	24 x 24 30 x 30 36 x 36 48 x 48	M CR-SL CR-ML O	2C.29 2C.29 2C.29 2C.29
W19-1		Black on Yellow	144 x 48	F	2C.24
W19-2		Black on Yellow	144 x 48	E	2C.24
W19-3		Black on Yellow	48 x 48	F	2C.24
W19-4		Black on Yellow	48 x 48	E	2C.24
W19-5		Black on Yellow	90 x 48	E, F	2C.24
W20-1		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F, O	6F.18 5G.5,6F.18 5G.5,6F.18
W20-2		Black on Orange or Fluorescent Pink	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F, O	6F.19,6I.1 6F.19,6I.1 6F.19,6I.1
W20-3		Black on Orange or Fluorescent Pink	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F, O	6F.20,6I.1 5G.5,6F.20,6I.1 5G.5,6F.20,6I.1
W20-3a		Black on Orange	18 x 18	B-Path	6F.20.1
W20-4		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F, O	6F.21 5G.5,6F.21 5G.5,6F.21
W20-7		Black on Orange or Fluorescent Pink	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F, O	6F.31,6I.1 5G.5,6F.31,6I.1 5G.5,6F.31,6I.1

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W20-8		Black on Orange	18 x 18	CR-SL, CR-ML	6E.3
W20-X3		Black on Orange or Fluorescent Pink	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.24.1,6I.1 6F.24.1,6I.1 6F.24.1,6I.1
W20-X6		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.50 6F.50 6F.50
W20-X11		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.50 6F.50 6F.50
W20-X13 (R or L)		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.22 6F.22 6F.22
W20-X17		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.50 6F.50 6F.50
W21-1		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F, O	6F.33 5G.5,6F.33 5G.5,6F.33
W21-2		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F, O	6F.34 5G.5,6F.34 5G.5,6F.34
W21-3		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F, O	5G.5,6F.35 6F.35 5G.5,6F.35
W21-4		Black on Orange	36 x 18	CR-SL, CR-ML	6G.6
W21-5		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F, O	6F.37 5G.5,6F.37 5G.5,6F.37
W21-5a (R or L)		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F, O	6F.37 6F.37 6F.37

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W21-6		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F, O	6F.38 5G.5,6F.38 5G.5,6F.38
W21-6a		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F, O	6F.38 6F.38 6F.38
W21-7		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F, O	6F.39 5G.5,6F.39 5G.5,6F.39
W21-8		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F, O	6G.6 6G.6 6G.6
W21-X1		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.44.3 6F.44.3 6F.44.3
W21-X5 (R or L)		Black on Orange or Fluorescent Pink	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.22,6I.1 6F.22,6I.1 6F.22,6I.1
W21-X5c		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.23 6F.23 6F.23
W21-X6		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.38.1 6F.38.1 6F.38.1
W21-X8		Black on Yellow	36 x 30	CR-SL	5C.11.1
W21-X9		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.44.2 6F.44.2 6F.44.2
W22-1		Black on Orange	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.41 6F.41 6F.41

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
W22-2		Black on Orange	42 x 36	CR-SL, CR-ML, E, F	6F.42
W22-3		Black on Orange	36 x 30 42 x 36	M CR-SL, CR-ML, E, F	6F.43 6F.43 6F.43
W23-1		Black on Orange	48 x 24	CR-SL, CR-ML, E, F	6F.27
W23-2		Black on Yellow	30 x 30 36 x 36 48 x 48	M CR-SL, CR-ML E, F	6F.30 2C.52,6F.30 6F.30
W24-1cP		Black on Orange	24 x 24 30 x 30	CR-SL, CR-ML E, F	6F.49 6F.49
W25-1		Black on Yellow	24 x 30	CR-SL, CR-ML	2C.48
W25-2		Black on Yellow	24 x 30	CR-SL, CR-ML	2C.48

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
M1-1 (1 or 2 digits)		White on Red and Blue	24 x 24 36 x 36	M, CR-SL, CR-ML O	2D.11 2D.11,2E.27
M1-1 (3 digit)		White on Red and Blue	30 x 24 45 x 36	M, CR-SL, CR-ML O	2D.11 2D.11,2E.27
M1-2 (1 or 2 digits)		White on Green	24 x 24 36 x 36	M, CR-SL, CR-ML O	2D.11 2D.11,2E.27
M1-3 (1 or 2 digits)		White on Green	24 x 24 36 x 36	M, CR-SL, CR-ML O	2D.11 2D.11,2E.27
M1-4 (1 or 2 digits)		White on Black	24 x 24 36 x 36	M, CR-SL, CR-ML O	2D.11 2D.11,2E.27
M1-4a (1 or 2 digits)		Black on White	22 x 24 36 x 36	M, CR-SL, CR-ML O	2D.11 2D.11,2E.27
M1-5a Independent		White on Gold and Blue	24 x 24 36 x 36	M, CR-SL, CR-ML O	2D.11 2D.11
M1-5b Overlay (1 or 2 digits)		White on Gold and Blue	24 x 24 36 x 36	M, CR-SL, CR-ML O	2D.11 2D.11
M1-5b Overlay (3 digit)		White on Gold and Blue	30 x 24 45 x 36	M, CR-SL, CR-ML O	2D.11 2D.11
M1-6		White and Yellow on Blue	24 x 24 36 x 36	M, CR-SL, CR-ML O	2D.11 2D.11
M1-7		White on Brown	18 x 18 24 x 24 36 x 36	M CR-SL, CR-ML O	2D.11 2D.11 2D.11

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
M1-8		Green on White	12 x 18 18 x 24	B-Path B/Rt	9B.21 9B.21
M1-8a		Green on White	12 x 18 18 x 24	B-Path B/Rt	9B.21 9B.21
M1-9		Black on White	12 x 18 18 x 24	B-Path B/Rt	9B.21 9B.21
M1-10		White on Blue	36 x 36	F	2E.28
M1-10a		White on Blue	36 x 36	F	2E.28
M1-X1		Green on White	18 x 18 24 x 24	M CR-SL, CR-ML, E	2D.11
M1-X3		Black on White	24 x 24 36 x 36	M, CR-SL, CR-ML O	2D.11
M1-X4 Independent		Black on White	24 x 24 36 x 36	M, CR-SL, CR-ML O	2D.11
M1-X4a Overlay		Black on White	24 x 24 36 x 36	M, CR-SL, CR-ML O	2D.11
M1-X5R		White on Brown	24 x 24	CR-SL, CR-ML, E	2M.10
M1-X5X		White on Brown	24 x 24	CR-SL, CR-ML, E	2M.10

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
M2-1		Black on White	12 x 6 21 x 15 30 x 21	B-Path, B/Rt M, CR-SL, CR-ML E, F, O	9B.22 2D.13 2D.13
M2-1a		White on Blue	12 x 6 21 x 15 30 x 21	B-Path, B/Rt M, CR-SL, CR-ML E, F, O	9B.22 2D.13 2D.13
M2-2		White on Green	60 x 48	CR-SL, CR-ML	2D.14
M3-1		Black on White	12 x 6 24 x 12 36 x 18	B-Path, B/Rt M, CR-SL, CR-ML E, F, O	9B.22 2D.15 2D.15
M3-1a		White on Blue	12 x 6 24 x 12 36 x 18	B-Path, B/Rt M, CR-SL, CR-ML E, F, O	9B.22 2D.15 2D.15
M3-2		Black on White	12 x 6 24 x 12 36 x 18	B-Path, B/Rt M, CR-SL, CR-ML E, F, O	9B.22 2D.15 2D.15
M3-2a		White on Blue	12 x 6 24 x 12 36 x 18	B-Path, B/Rt M, CR-SL, CR-ML E, F, O	9B.22 2D.15 2D.15
M3-3		Black on White	12 x 6 24 x 12 36 x 18	B-Path, B/Rt M, CR-SL, CR-ML E, F, O	9B.22 2D.15 2D.15
M3-3a		White on Blue	12 x 6 24 x 12 36 x 18	B-Path, B/Rt M, CR-SL, CR-ML E, F, O	9B.22 2D.15 2D.15
M3-4		Black on White	12 x 6 24 x 12 36 x 18	B-Path, B/Rt M, CR-SL, CR-ML E, F, O	9B.22 2D.15 2D.15
M3-4a		White on Blue	12 x 6 24 x 12 36 x 18	B-Path, B/Rt M, CR-SL, CR-ML E, F, O	9B.22 2D.15 2D.15
M4-1		Black on White	12 x 6 24 x 12 36 x 18	B-Path, B/Rt M, CR-SL, CR-ML E, F, O	9B.22 2D.17 2D.17
M4-1a		Black on White	12 x 6 24 x 12 36 x 18	B-Path, B/Rt M, CR-SL, CR-ML E, F, O	9B.22 2D.17 2D.17
M4-2		Black on White	12 x 6 24 x 12 36 x 18	B-Path, B/Rt M, CR-SL, CR-ML E, F, O	9B.22 2D.18 2D.18

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
M4-3		Black on White	12 x 6 24 x 12 36 x 18	B-Path, B/Rt M, CR-SL, CR-ML E, F, O	9B.22 2D.19 2D.10
M4-4		Black on White	24 x 12 36 x 18	M, CR-SL, CR-ML E, F, O	2B.61,2D.20 2B.61,2D.20
M4-5		Black on White	12 x 6 24 x 12 36 x 18	B-Path, B/Rt M, CR-SL, CR-ML E, F, O	9B.22 2D.21 2D.21
M4-5a		White on Blue	12 x 6 24 x 12 36 x 18	B-Path, B/Rt M, CR-SL, CR-ML E, F, O	9B.22 2D.21 2D.21
M4-6		Black on White	12 x 6 24 x 12 36 x 18	B-Path, B/Rt M, CR-SL, CR-ML E, F, O	9B.22 2D.22 2D.22
M4-6a		White on Blue	12 x 6 24 x 12 36 x 18	B-Path, B/Rt M, CR-SL, CR-ML E, F, O	9B.22 2D.22 2D.22
M4-7		Black on White	12 x 6 24 x 12 36 x 18	B-Path, B/Rt M, CR-SL, CR-ML E, F, O	9B.22 2D.24 2D.24
M4-7a		Black on White	12 x 6 24 x 12 36 x 18	B-Path, B/Rt M, CR-SL, CR-ML E, F, O	9B.22 2D.24 2D.24
M4-8		Black on Orange	12 x 6 24 x 12 30 x 15	B-Path, B/Rt CR-SL, CR-ML E, F, O	9B.22 6F.59
M4-8a		Black on Orange	24 x 18	CR-SL, CR-ML, E, F	6F.59
M4-8b		Black on Orange	24 x 12	CR-SL, CR-ML, E, F, O	6F.59
M4-9 (R or L)		Black on Orange	30 x 24 48 x 36	CR-SL, CR-ML E, F, O	6F.59
M4-9a (R or L)		Black on Orange	30 x 24	CR-SL, CR-ML	6F.59
M4-9b (R or L)		Black on Orange	30 x 24	CR-SL, CR-ML	6F.59

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
M4-9c (R or L)		Black on Orange	30 x 24	CR-SL, CR-ML	6F.59
M4-10 (R or L)		Black on Orange	48 x 18	CR-SL, CR-ML	6F.59
M4-14		Black on White	12 x 6 24 x 12 36 x 18	B-Path, B/Rt M, CR-SL, CR-ML O	9B.22 2D.23 2D.23
M4-14a		White on Blue	12 x 6 24 x 12 36 x 18	B-Path, B/Rt M, CR-SL, CR-ML O	9B.22 2D.23 2D.23
M4-15		Black on Yellow	24 x 12 36 x 18	M, CR-SL, CR-ML E, F, O	2F.11 2F.11
M4-16		Black on White	24 x 12 36 x 18	M, CR-SL, CR-ML E, F, O	2F.12 2F.12
M4-17		Black on White	48 x 48	E, F	2F.13 2F.13
M4-18		Black on White	48 x 48	E, F	2F.13 2F.13
M4-20		Black, Green and White on Purple	24 x 24 36 x 36	M, CR-SL, CR-ML E, F, O	2F.12 2F.12
M5-1 (R or L)		Black on White	12 x 9 21 x 15 30 x 21	B-Path, B/Rt M, CR-SL, CR-ML E, F	9B.22 2D.26 2D.26
M5-1a (R or L)		White on Blue	12 x 9 21 x 15 30 x 21	B-Path, B/Rt M, CR-SL, CR-ML E, F	9B.22 2D.26 2D.26
M5-2 (R or L)		Black on White	12 x 9 21 x 15 30 x 21	B-Path, B/Rt M, CR-SL, CR-ML E, F	9B.22 2D.26 2D.26
M5-2a (R or L)		White on Blue	12 x 9 21 x 15 30 x 21	B-Path, B/Rt M, CR-SL, CR-ML E, F	9B.22 2D.26 2D.26
M5-3 (R or L)		Black on White	21 x 15 30 x 21	M, CR-SL, CR-ML E, F	2D.26 2D.26
M5-3a (R or L)		White on Blue	21 x 15 30 x 21	M, CR-SL, CR-ML E, F	2D.26 2D.26

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
M5-4		Black on White	24 x 18 36 x 24	M, CR-SL, CR-ML E, F	2D.27 2D.27
M5-5		Black on White	24 x 18 36 x 24	M, CR-SL, CR-ML E, F	2D.27 2D.27
M5-6		Black on White	24 x 18 36 x 24	M, CR-SL, CR-ML E, F	2D.27 2D.27
M6-1 (R or L)		Black on White	12 x 9 21 x 15 30 x 21	B-Path, B/Rt M, CR-SL, CR-ML E, F	9B.22 2D.28 2D.28
M6-1a (R or L)		White on Blue	12 x 9 21 x 15 30 x 21	B-Path, B/Rt M, CR-SL, CR-ML E, F	9B.22 2D.28 2D.28
M6-2 (R or L)		Black on White	12 x 9 21 x 15 30 x 21	B-Path, B/Rt M, CR-SL, CR-ML E, F	9B.22 2D.28 2D.28
M6-2a (R or L)		White on Blue	12 x 9 21 x 15 30 x 21	B-Path, B/Rt M, CR-SL, CR-ML E, F	9B.22 2D.28 2D.28
M6-3		Black on White	12 x 9 21 x 15 30 x 21	B-Path, B/Rt M, CR-SL, CR-ML E, F	9B.22 2D.28 2D.28
M6-3a		White on Blue	12 x 9 21 x 15 30 x 21	B-Path, B/Rt M, CR-SL, CR-ML E, F	9B.22 2D.28 2D.28
M6-4		Black on White	12 x 9 21 x 15 30 x 21	B-Path, B/Rt M, CR-SL, CR-ML E, F	9B.22 2D.28 2D.28
M6-4a		White on Blue	12 x 9 21 x 15 30 x 21	B-Path, B/Rt M, CR-SL, CR-ML E, F	9B.22 2D.28 2D.28
M6-5 (R or L)		Black on White	12 x 9 21 x 15 30 x 21	B-Path, B/Rt M, CR-SL, CR-ML E, F	9B.22 2D.28 2D.28
M6-5a (R or L)		White on Blue	12 x 9 21 x 15 30 x 21	B-Path, B/Rt M, CR-SL, CR-ML E, F	9B.22 2D.28 2D.28
M6-6 (R or L)		Black on White	12 x 9 21 x 15 30 x 21	B-Path, B/Rt M, CR-SL, CR-ML E, F	9B.22 2D.28 2D.28
M6-6a (R or L)		White on Blue	12 x 9 21 x 15 30 x 21	B-Path, B/Rt M, CR-SL, CR-ML E, F	9B.22 2D.28 2D.28

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
M6-7 (R or L)		Black on White	12 x 9 21 x 15 30 x 21	B-Path, B/Rt M, CR-SL, CR-ML E, F	9B.22 2D.28 2D.28
M6-7a (R or L)		White on Blue	12 x 9 21 x 15 30 x 21	B-Path, B/Rt M, CR-SL, CR-ML E, F	9B.22 2D.28 2D.28
D1-1		White on Green	varies x 6 varies x 18 varies x 30	B-Path B/Rt, M, CR-SL, CR-ML E, F	9B.20 2D.37,9B.20 2D.37 2D.37
D1-1a		White on Green	varies x 6 varies x 18 varies x 30	B-Path B/Rt, M, CR-SL, CR-ML E, F	9B.20 2D.37,9B.20 2D.37 2D.37
D1-1b		White on Green	varies x 6	B-Path, B/Rt	9B.20
D1-1c		White on Green	varies x 6	B-Path, B/Rt	9B.20
D1-1d		White on Green	varies x 18	M, CR-SL, CR-ML	2D.38
D1-1e		White on Green	varies x 42	CR-SL, CR-ML	2D.38
D1-2		White on Green	varies x 12 varies x 30 varies x 54	B-Path B/Rt, M, CR-SL, CR-ML E, F	9B.20 2D.37,9B.20 2D.37 2D.37
D1-2a		White on Green	varies x 12 varies x 30 varies x 54	B-Path B/Rt, M, CR-SL, CR-ML E, F	9B.20 2D.37,9B.20 2D.37 2D.37
D1-2b		White on Green	varies x 6	B-Path, B/Rt	9B.20
D1-2c		White on Green	varies x 6	B-Path, B/Rt	9B.20
D1-2d		White on Green	varies x 18	M, CR-SL, CR-ML	2D.38

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
D1-3		White on Green	varies x 18 varies x 42 varies x 72	B-Path B/Rt, M, CR-SL, CR-ML E, F	9B.20 2D.37,9B.20 2D.37 2D.37
D1-3a		White on Green	varies x 18 varies x 42 varies x 72	B-Path B/Rt, M, CR-SL, CR-ML E, F	9B.20 2D.37,9B.20 2D.37 2D.37
D1-3b		White on Green	varies x 18	B-Path, B/Rt	9B.20
D1-3c		White on Green	varies x 18	B-Path, B/Rt	9B.20
D1-3d		White on Green	varies x 42	M, CR-SL, CR-ML	2D.38
D1-X1 (R or L)		White on Green	30 x 24 42 x 36	CR-SL, CR-ML E, F	2H.7.1
D1-X3 (R or L)		White on Green	36 x 24 54 x 36	CR-SL, CR-ML E, F	2H.7.1
D1-X4 (R or L)		White on Green	48 x 12 60 x 18	CR-SL, CR-ML E, F	2H.2
D1-X5 (R or L)		White on Green	72 x 36 96 x 48	CR-SL, CR-ML E, F	2H.7.1
D1-X6 (R or L)		White on Green	78 x 36 108 x 48	CR-SL, CR-ML E, F	2H.2.1
D2-1		White on Green	varies x 18 varies x 30	M, CR-SL, CR-ML E, F	2D.41
D2-2		White on Green	varies x 30 varies x 54	M, CR-SL, CR-ML E, F	2D.41
D2-3		White on Green	varies x 42 varies x 72	M, CR-SL, CR-ML E, F	2D.41

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
D3-1		White on Green	varies x 6 varies x 8 varies x 12 varies x 18	B-Path B/Rt, M CR-SL, CR-ML E, F	9B.20 2D.43,9B.20 2D.43 2D.47
D3-1a		White on Green	varies x 8 varies x 12 varies x 18	M CR-SL, CR-ML E, F	2D.43 2D.43 2D.43
D3-2		White on Green	varies x 30 varies x 42	CR-SL, CR-ML E, F	2D.44 2D.44
D3-2		White on Green	varies x 42 varies x 66	CR-SL, CR-ML E, F	2D.44 2D.44
D3-2		White on Green	varies x 60 varies x 84	CR-SL, CR-ML E, F	2D.44 2D.44
D4-1		Green on White	18 x 15 30 x 24	M CR-SL, CR-ML	2D.47 2D.47
D4-2 (R or L)		White on Green	24 x 30 30 x 36 36 x 48	M CR-SL, CR-ML E, F	2D.48 2D.48 2D.48
D4-3 (R or L)		Green on White	12 x 18	B-Path, B/Rt	9B.23
D5-1		White on Blue	66 x 36 96 x 54	CR-SL, CR-ML E, F	21.5 21.5
D5-1a		White on Blue	78 x 36 114 x 48 120 x 60	CR-SL, CR-ML E F	21.5 21.5 21.5
D5-2		White on Blue	66 x 36 96 x 54	CR-SL, CR-ML E, F	21.5 21.5

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
D5-2a		White on Blue	42 x 48 66 x 72 78 x 78	CR-SL, CR-ML E F	21.5 21.5 21.5
D5-5		White on Blue	42 x 48	CR-SL, CR-ML	21.5
D5-6		White on Blue	60 x 48 90 x 72	CR-SL, CR-ML E, F	21.5 21.5
D5-7		White on Blue	90 x 72 132 x 96 114 x 102	CR-SL, CR-ML E F	21.8 21.8 21.8
D5-8		White on Blue	84 x 72 120 x 96 120 x 102	CR-SL, CR-ML E F	21.8 21.8 21.8
D5-11		White on Blue	90 x 72 132 x 96 144 x 120	CR-SL, CR-ML E F	21.8 21.8 21.8
D5-12		White on Blue	156 x 78	E, F	21.4
D5-12P		White on Blue	114 x 48	E, F	21.4

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
D5-13		White on Blue	84 x 48 126 x 72	CR-SL, CR-ML E, F	21.6 21.6
D5-14		White on Blue	78 x 60 96 x 72	CR-SL, CR-ML E, F	21.6 21.6
D5-15		White on Blue	66 x 48 96 x 72	CR-SL, CR-ML E, F	21.7 21.7
D5-16		White on Blue	72 x 54 96 x 66	CR-SL, CR-ML E, F	21.7 21.7
D5-X1		White on Blue	36 x 36	CR-SL, CR-ML, E	21.5
D5-X1a		White on Blue	36 x 12	CR-SL, CR-ML, E	21.5
D5-X1b		White on Brown	36 x 18	CR-SL, CR-ML, E	21.5
D5-X1c		White on Brown	36 x 18	CR-SL, CR-ML, E	21.5
D5-X2 (R or L)		White on Blue	36 x 30	CR-SL, CR-ML, E	21.5
D6-4		Blue and Red on White	24 x 24	M, CR-SL, CR-ML E, F	2D.55
D6-4a		Blue and Red on White	24 x 12	M, CR-SL, CR-ML E, F	2D.55

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
D7-X7 (R or L)		White on Brown	varies x 30	CR-SL, CR-ML, E, F	21.5.1
D7-X7a (R or L)		White on Brown	varies x 30	CR-SL, CR-ML, E, F	21.5.1
DNR sign		White on Brown	18 x 30	CR-SL, CR-ML, E, F	21.5.1
D8-1		White on Green	60 x 48 78 x 60 96 x 72	M CR-SL, CR-ML, E, F	2D.49 2D.49,2E.54 2D.49,2E.54
D8-2		White on Green	66 x 54 84 x 72 108 x 90	M CR-SL, CR-ML, E, F	2D.49 2D.49,2E.54 2D.49,2E.54
D8-3		White on Green	48 x 42 66 x 60 84 x 78	M CR-SL, CR-ML, E, F	2D.49 2D.49,2E.54 2D.49,2E.54
D9-1		White on Blue	24 x 24 30 x 30	CR-SL, CR-ML, E, F	21.2 21.2
D9-2		White on Blue	24 x 24 30 x 30	CR-SL, CR-ML, E, F	21.2 21.2
D9-3		White on Blue	24 x 24 30 x 30	CR-SL, CR-ML, E, F	21.2 21.2
D9-3a		White on Blue	24 x 24 30 x 30	CR-SL, CR-ML, E, F	21.2 21.2
D9-4		White on Blue	24 x 30 36 x 48	CR-SL, CR-ML, E, F	21.2 21.2

Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
D9-20		White on Blue	24 x 24 30 x 30	CR-SL, CR-ML E, F	2I.2
D9-20aP		White on Blue	24 x 12 30 x 12	CR-SL, CR-ML E, F	2I.2
D9-21		White on Blue	24 x 24 30 x 30	CR-SL, CR-ML E, F	2I.2
D9-22		White on Blue	24 x 24 30 x 30	CR-SL, CR-ML E, F	2I.2
D9-X6		White on Blue	72 x 18	CR-SL, CR-ML	2K.1 thru 2K.7
D10-1		White on Green	6 x 12 10 x 18 12 x 24	B-Path B/Rt, CR-SL, CR-ML E, F	9B.24 2H.5,9B.24 2H.5
D10-1a		White on Green	6 x 18 10 x 27 12 x 36	B-Path B/Rt, CR-SL, CR-ML E, F	9B.24 2H.5,9B.24 2H.5
D10-2		White on Green	6 x 18 10 x 27 12 x 36	B-Path B/Rt, CR-SL, CR-ML E, F	9B.24 2H.5,9B.24 2H.5
D10-2a		White on Green	6 x 24 10 x 36 12 x 48	B-Path B/Rt, CR-SL, CR-ML E, F	9B.24 2H.5,9B.24 2H.5
D10-3		White on Green	6 x 24 10 x 36 12 x 48	B-Path B/Rt, CR-SL, CR-ML E, F	9B.24 2H.5,9B.24 2H.5
D10-3a		White on Green	6 x 30 10 x 36 12 x 60	B-Path B/Rt, CR-SL, CR-ML E, F	9B.24 2H.5,9B.24 2H.5

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
D10-4		White on Green	18 x 54	CR-SL, CR-ML E, F	2H.6
D10-5		White on Green	18 x 60	CR-SL, CR-ML E, F	2H.6
D11-1		White on Green	24 x 18	CR-SL, CR-ML E, F	9B.20
D11-1a		White on Green	18 x 18	CR-SL, CR-ML	9B.25
D11-1bP		White on Green	18 x 6	CR-SL, CR-ML	9B.25
D11-1c		White on Green	24 x 18	CR-SL, CR-ML E, F	9B.20
D11-2		White on Green	18 x 18	CR-SL, CR-ML	9B.25
D11-3		White on Green	18 x 18	CR-SL, CR-ML	9B.25
D11-4		White on Green	18 x 18	CR-SL, CR-ML	9B.25

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
D12-1		White on Blue	84 x 48 132 x 84	CR-SL, CR-ML E, F	2I.9 2I.9
D12-2a		White on Blue	60 x 30 114 x 48	CR-SL, CR-ML E, F	2I.11 2I.11
D12-2b		White on Blue	102 x 36	CR-SL, CR-ML	2I.11
D12-3		White on Blue	84 x 48 132 x 84	CR-SL, CR-ML E, F	2I.9 2I.9
D12-4		White on Blue	66 x 30 96 x 48	CR-SL, CR-ML E, F	2I.9 2I.9
D12-5		White on Blue	42 x 60 66 x 78	CR-SL, CR-ML E, F	2I.10 2I.10
D12-5a		White on Blue	42 x 36 66 x 48	CR-SL, CR-ML E, F	2I.10 2I.10
D13-1 (R or L)		White on Green	78 x 42	M	2D.54
D13-2		White on Green	78 x 42	M	2D.54
D13-3		White on Green	48 x 30	M	2D.46
D13-3a (R or L)		White on Green	48 x 42	M	2D.46

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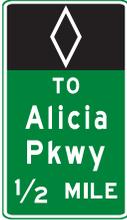
Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
D15-1		White on Green	varies x 96	M	2D.33
D17-1		White on Green	60 x 66	M	2D.51
D17-2		White on Green	60 x 54	M	2D.51
D17-7		White on Green	96 x 54	M	2D.52
E1-5P		White on Green	Varies x 30	E, F	2E.21
E1-5aP		Black on Yellow	72 x 30	E, F	2E.33
E1-5bP		White on Green	Varies x 54	E, F	2E.31
E5-1		White on Green	72 x 60	E, F	2E.37
E5-1a		White on Green	Varies x 60	E, F	2E.37
E5-1bP		White on Green	Varies x 30	E, F	2E.37
E5-2		Black on Orange	48 x 36	CR-SL, CR-ML, E, F	6F.28
E5-2a		Black on Orange	48 x 36	CR-SL, CR-ML, E, F	6F.28
E5-3		Black on Orange	48 x 36	CR-SL, CR-ML, E, F	6F.29

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
E6-2		White on Green	Varies x 120	E, F	2E.12
E6-2a		White on Green	Varies x 90	E, F	2E.12
E8-1		White on Black and Green	48 x 96	E, F	2G.10
E8-1a		White on Black and Green	48 x 84	E, F	2G.10
E8-2		White on Black and Green	222 x 96	E, F	2G.11
E8-2a		White on Black and Green	186 x 108	E, F	2G.11
E8-3		White on Black and Green	186 x 96	E, F	2G.11
E8-4		White on Black and Green	60 x 78	E, F	2G.15
E8-5		White on Black and Green	varies x 90	E, F	2G.13

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
E8-6		White on Black and Green	varies x 84	E, F	2G.13
E11-1		Black on Yellow	174 x 36	E, F	2E.24
E11-1a		Black on Yellow	66 x 18	E, F	2E.24
E11-1b		Black on Yellow	66 x 18	E, F	2E.24
E11-1c		Black on Yellow	120 x 18	E, F	2E.24
E11-1d		Black on Yellow	174 x 36	E, F	2E.24
E11-1e		Black on Yellow	222 x 36	E, F	2E.24
E11-1f		Black on Yellow	222 x 36	E, F	2E.24
E11-2		Black on Yellow	60 x 18	E, F	2E.40
E13-1P		Black on Yellow	72 x 24	E, F	2E.37
E13-2		Black on Yellow	162 x 24	E, F	2E.36
EM-1		Blue on White	24 x 24	M	2N.3
EM-1a		Blue on White	24 x 24	M	2N.3
EM-2		Black on White	30 x 24	M	2N.4
EM-3		Black on White	30 x 24	M	2N.5

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
EM-4		Black on White	24 x 30	M	2N.6
EM-5		Black on White	24 x 30	M	2N.7
EM-6a (R or L)		Black on White	30 x 24	M	2N.8
EM-6b (R or L)		Black on White	30 x 24	M	2N.8
EM-6c (R or L)		Black on White	30 x 24	M	2N.8
EM-6d (R or L)		Black on White	30 x 24	M	2N.8
EM-7a (R or L)		Black on White	30 x 24	M	2N.9
EM-7b (R or L)		Black on White	30 x 24	M	2N.9
EM-7c		Black on White	30 x 24	M	2N.9
EM-7d (R or L)		Black on White	30 x 24	M	2N.9

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Guide to Sign Sizes: B-Path--Shared Use Bike Path, B/Rt--Bike Route on Roadway, M--Minimum, CR-SL--Conventional Road Single Lane, CR-ML--Conventional Road Multi-Lane, E--Expressway, F--Freeway, O--Oversize

Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
G20-1		Black on Orange	36 x 18 48 x 24	CR-SL, CR-ML E, F	6F.56 6F.56
G20-2		Black on Orange	36 x 18 48 x 24	CR-SL, CR-ML E, F	6F.57 6F.57
G20-4		Black on Orange	36 x 18	CR-SL, CR-ML	6F.58
G20-5aP		Black on Orange	24 x 18 36 x 24	CR-SL, CR-ML	6F.12 6F.12
G20-X1		Black on Orange	72 x 60 90 x 78	CR-SL, CR-ML	6F.56.1 6F.56.1
I1-1		White on Green	24 x 36	CR-SL, CR-ML	2H.3
I1-X1		White on Blue	60 x 36	CR-SL, CR-ML, E, F	2H.8
I2-3		White on Green	varies x 24 varies x 36	CR-SL, CR-ML, E, F	2H.2.2 2H.2.2
I2-3		White on Green	varies x 36 varies x 48	CR-SL, CR-ML, E, F	2H.2.2 2H.2.2
I2-5		White on Green	varies x 24 varies x 36	CR-SL, CR-ML, E, F	2H.2.2 2H.2.2
I2-10		Various on Yellow	66 x 42	CR-SL, CR-ML	2H.2

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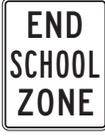
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I2-12		Various on Yellow	66 x 42	CR-SL, CR-ML	2H.2
I3-1		White on Green	varies x 18 varies x 24	CR-SL, CR-ML, E, F	2H.2.3 2H.2.3
I3-1		White on Green	varies x 24 varies x 36	CR-SL, CR-ML, E, F	2H.2.3 2H.2.3
I-5		White on Green	24 x 24 30 x 30	CR-SL, CR-ML, E, F	2H.2 2H.2
I-6		White on Green	24 x 24 30 x 30	CR-SL, CR-ML, E, F	2H.2 2H.2
I-7		White on Green	24 x 24 30 x 30	CR-SL, CR-ML, E, F	2H.2 2H.2
I-8		White on Green	24 x 24 30 x 30	CR-SL, CR-ML, E, F	2H.2 2H.2
I-9		White on Green	24 x 24 30 x 30	CR-SL, CR-ML, E, F	2H.2 2H.2
I-11		White on Green	30 x 48	CR-SL, CR-ML, E, F	2H.2.1 2H.2.1
I-12		White on Green	24 x 24 30 x 30	CR-SL, CR-ML, E, F	2H.2,8B.26 2H.2,8B.26
I-13		White on Green	15 x 9	CR-SL, CR-ML, E	8B.18

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
S1-1		Black on Yellow or Fluorescent Yellow-Green	30 x 30	M	7B.8,7B.9, 7B.11,7B.12
			36 x 36	CR-SL, CR-ML	7B.8,7B.9, 7B.11,7B.12
			48 x 48	O	7B.8,7B.9, 7B.11,7B.12
S3-1		Black on Yellow or Fluorescent Yellow-Green	30 x 30	M	7B.13
			36 x 36	CR-SL, CR-ML,	7B.13
			48 x 48	O	7B.13
S3-2a		Black on Yellow or Fluorescent Yellow-Green	30 x 30	M	7B.14
			36 x 36	CR-SL, CR-ML,	7B.14
			48 x 48	O	7B.14
S3-X1		Black on White	24 x 30	CR-SL, CR-ML	7B.12.1
S4-1P		Black on White	24 x 10	CR-SL, CR-ML,	7B.15
			36 x 18	O	7B.15
S4-2P		Black on White	24 x 10	CR-SL, CR-ML,	7B.9,7B.15
			36 x 18	O	7B.9,7B.15
S4-3P		Black on Yellow or Fluorescent Yellow-Green	24 x 8	CR-SL, CR-ML,	7B.9,7B.15
			36 x 12	O	7B.9,7B.15
S4-4P		Black on White	24 x 10	CR-SL, CR-ML,	7B.15
			36 x 18	O	7B.15
S4-5		Black on Yellow or Fluorescent Yellow-Green	30 x 30	M	7B.16
			36 x 36	CR-SL, CR-ML,	7B.16
			48 x 48	O	7B.16
S4-5a		Black on Yellow or Fluorescent Yellow-Green	30 x 30	M	7B.16
			36 x 36	CR-SL, CR-ML,	7B.16
			48 x 48	O	7B.16
S4-6P		Black on White	24 x 10	CR-SL, CR-ML,	7B.15
			36 x 18	O	7B.15
S4-7P		Black on Yellow or Fluorescent Yellow-Green	24 x 10	CR-SL, CR-ML,	7B.9
			36 x 18	O	7B.9

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
S5-1		Black on Yellow or Fluorescent Yellow-Green	24 x 48 36 x 72	CR-SL, CR-ML, O	7B.15 7B.15
S5-2		Black on White	24 x 30 36 x 48	CR-SL, CR-ML, O	7B.9 7B.9
S5-3		Black on White	24 x 30 36 x 48	CR-SL, CR-ML, O	7B.15 7B.15

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
RS-001		White on Brown	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10
RS-002		White on Brown	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10
RS-003		White on Brown	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10
RS-004		White on Brown	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10
RS-005		White on Brown	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10
RS-006		White on Brown	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10
RS-007		White on Brown	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10
RS-008		White on Brown	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10
RS-009		White on Brown	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10
RS-0010		White on Brown	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
RS-011		White on Brown	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10
RS-012		White on Brown	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10
RS-013		White on Brown	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10
RS-014		White on Brown	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10
RS-015		White on Brown	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10
RS-016		White on Brown	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10
RS-017		White on Brown	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10
RS-018		White on Brown	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10
RS-019		White on Brown	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10
RS-0020		White on Brown	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10

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Sign Number	Sign Picture	Sign Colors	Sign Size (Inches)	Use	Manual Section(s)
RS-021		White on Brown	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10
RS-022		White on Brown	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10
RS-023		White on Brown	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10
RS-024		White on Brown	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10
RS-025		White on Brown	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10
RS-026		White on Brown	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10
RS-027		White on Brown	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10
RS-028		White on Blue	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10
RS-029		White on Brown	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10
RS-030		White on Brown	24 x 24 30 x 30	CR-SL, CR-ML E, F	2M.1 thru 2M.10

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